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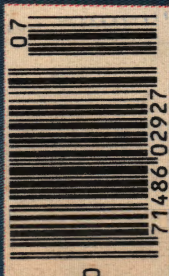
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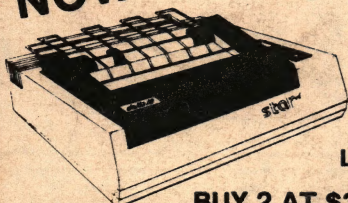
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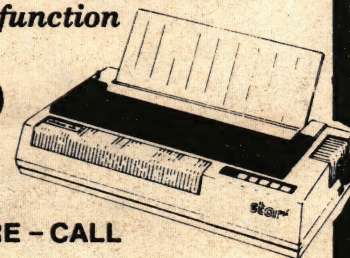
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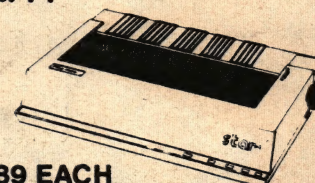
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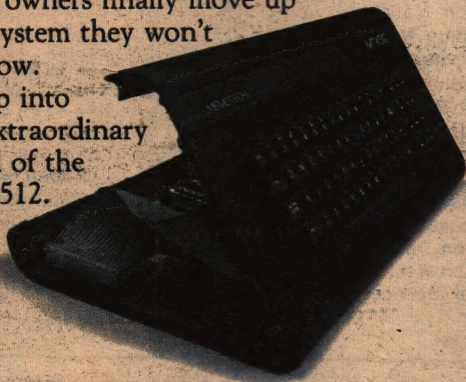
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Introducing The Apple //c

The Apple // has been the foundation of the Apple Computer Company ever since the first of these wonder machines appeared on the market. It has not only built the company into one of the leaders of the industry, but it has created the largest and most organized group of loyal users.

In spite of this, the Apple // was rapidly losing ground before the attack of the IBM PC and its clones. The fact that Apple // has its own DOS, not related to any other family seemed to take it out of the mainstream of current computer development. First, Commodore captured the home market with its Commodore 64 selling for under \$300 and then IBM gained the business market with the PC. In spite of the huge library of software that would run on the Apple //, it barely held its own. The only thing that kept the Apple // alive in the market was sharp discount selling by its dealers.

Then IBM came out with its long awaited "home computer" code-named the Peanut and released as the IBM PCjr. In spite of a massive ad campaign by IBM, the computer press saw the PCjr as a flawed computer. It was said that the Jr had a very poor keyboard and limits to its capabilities imposed by IBM's desire to sell more PC's.

The public realized that for the same money that they would have to spend for a basic IBM PCjr, they could get an Apple //e with unlimited growth potential. They bought the Apples in record quantities in the last quarter of 1983, and the first quarter of 1984. The IBM PCjr's have moved very slowly.

Now Apple Computer in a masterstroke has introduced a transportable version of the series, the Apple //c. This little 7 1/2 pound computer takes up about the same area as a notebook. It has a built-in disk drive, with provisions for an additional disk drive. It also contains 128 Kbytes of user memory and 16 Kbytes of ROM firmware including Applesoft BASIC and a monitor program.

It is designed to be compatible with Apple //e in every way except one, there are no expansion slots for plug-in boards. Apple says that they have provided all of the major functions that would be accomplished by the usual run of plug-in boards to connectors on the rear

panel. If you want other functions, don't buy the Apple //c, get a //e, they are now even cheaper than the little fellow.

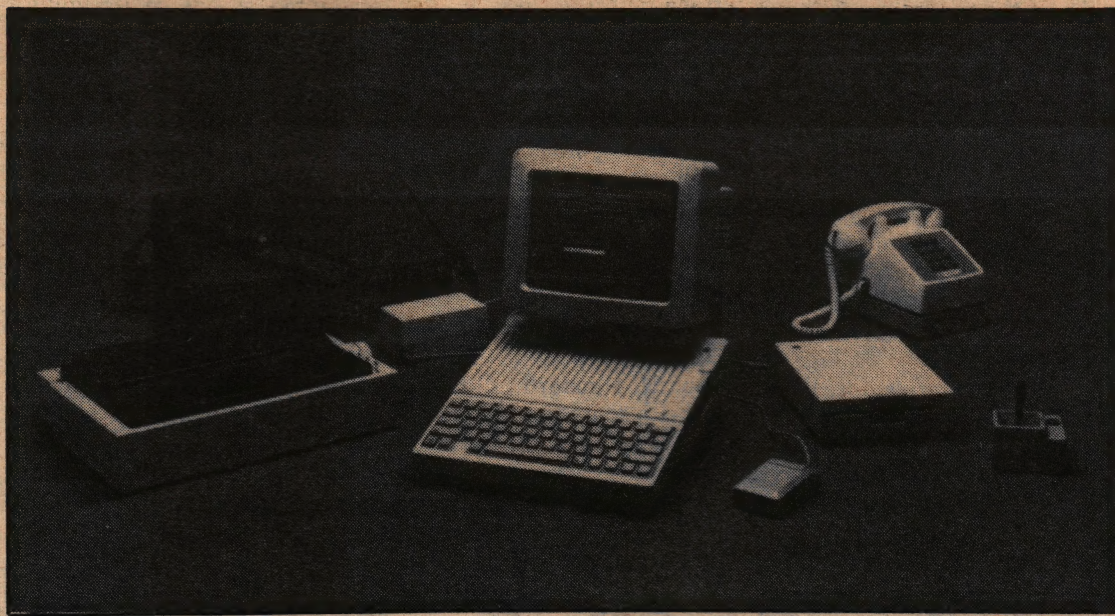
Apple claims that there are over 10,000 programs that will run on the Apple //c at the time of its release and many more special programs are being written for it.

The Apple //c will sell for \$1295 in an introductory package which includes the computer, external power supply, full set of manuals and six tutorial disks that will teach you all about your computer. The package includes an RF modulator so you can hook the //c up to your TV, or a external video monitor.

APPLE //c Peripherals

The //c is endowed with a full line of new peripherals at low cost. First there is a video monitor called Monitor //c, with a green phosphor display. Although the picture tube is only 9-inches, it is sharp and it reduces eye strain and fatigue. The Monitor //c sells for \$199 and the plastic stand that is designed to allow the monitor to be positioned at any viewing angle, is \$39. The Monitor //c has a handle for transportability.

To make the //c truly portable, a new flat screen will be available this fall for about \$600. This will provide 80 characters by 24 line and will attach to the top of the //c. This display was shown at the



The Apple //c System.

Apple // Forever Expo and it is a remarkable device. It is superior in resolution to any of the screens now in use on the "notebook computers". When the //c goes portable, it will be powered by a battery system thus freeing it from the power cord.

In addition to the display, Apple has provided a low cost, high resolution, dot matrix printer which uses a completely new printing technology. This printer is called The Scribe and it prints high quality text and graphics on plain paper by a process called thermal transfer. This process uses a special ink-coated ribbon and

a dot matrix print head. The print wires are selectively heated causing the ink to transfer to the paper. Unlike previous thermal this process does not require special paper and the ink ribbon can be either colored or black. The Scribe printer uses either black or a three-color ribbon. The colors are magenta, cyan and yellow. Mixing these colors, the printer can produce green, orange and purple. The ribbons are contained in special cassettes that are easily interchangeable.

The Scribe prints at a rate of 80-characters per second in draft mode. The letter-quality,

high resolution mode operates at 50 CPS and produces very attractive text. The user can switch between the two modes either by a front panel switch or by a software command. When printing graphics, the Scribe can print a 8-inch by 7.5-inch graphic image in less than four minutes.

The Scribe is 12 by 16 inches and weighs only 13 pounds. It operates from any RS-232C port and costs only \$299.

Apple Computer has been active in promoting the use of the Mouse input pointer device in both the Lisa and the

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"Apple // Forever" An Earthshaking Event

by Stan Veit

On April 24th, 1984, Apple Computer held the Apple // Forever Exposition at the Moscone Center in San Francisco. The Expo ran from 7:00 AM until after 11:00 PM and featured the introduction of the new Apple //c Portable Computer and a full line of peripherals. In addition, there were many demos of software for the Macintosh and Lisa.

The show was limited to the world network of Apple dealers, members of the press and members of the independent Apple //c and Macintosh software support teams.

At 7:00 AM, visitors started to register for the Expo and by 8:30 everybody was gathered in the main show area. Picture a vast stage with huge screens

for projection TV and film, multi-media displays as a backdrop. The press was seated in the front and behind was the thousands of Apple dealers and invited guests, plus many Apple employees. The members of the Apple // Engineering Team were dressed in Tuxedos with red sashes and they were scattered throughout the audience. While the people were taking their seats, the large screens scrolled the names of all the Apple dealers throughout the country.

Steve Wozniak, co-founder of Apple came out to warm up the audience and told some jokes about the IBM PCjr, and a few about politicians. He got a lot of laughs from the dealers. Then the stage darkens and the voice of Paul Terrell, founder

of the Byte Shops, is heard telling the story of the founding of Apple Computer on the basis of a 50 unit order for Apple I Computers from his company. Paul describes how the founders went to Cramer Electronics and asked for 30-days credit for the parts to build Paul's order, and got it! (Paul also sent Steve Jobs to Computer Mart of Los Angeles, and Computer Mart of New York who became the second and third Apple dealers.)

After this bit of Apple history, Steve Jobs, Chairman of The Board of Apple took the stage, to the applause of the assembled dealers and Apple employees. As head of the Macintosh team, Jobs proudly announced that Apple had exceeded the goal of selling 50,000 Macintoshes in 100 days.

He also described the progress that has been made in providing software for this new computer system.

Having spent all this time on the Macintosh, it was the turn of Apple //, the computer upon which the success of the company was built. He extolled the team which had produced the latest version of the Apple //, and described its features. Now was the time to pull the rabbit out of the hat, and Steve did just that! Asking, "Do you want to see it, well here it is!" At that moment, a whole group of Apple employees stood up waving the little computer. "Do you want a closer look?" asked Steve. At that the engineering team members,

Continued on page 10

Apple //c Continued from page 5

Macintosh. Now there is a Mouse program for the Apple // called MousePaint. This also runs on the //c and the cost has been kept down to \$99 because much of the mouse operating circuits are built into the computer. Many of the software developers hoping to be first with //c software have incorporated the mouse into their programs.

The Apple //c also includes provision for an additional disk drive. Each of the //c drives, like the other Apple // computers use 5 1/4-inch drives storing 140 kbytes.

Other peripherals for the Apple //c are two modems, one 300 baud for \$225 and a 1200

baud model for \$495. There is a game control group consists of a joystick for \$34.95, hand controllers for \$39 and a carrying case for \$39.

For those who want faster printing speed, the Apple Imagewriter at \$595 will also interface with the //c.

Looking at the features of the //c, we find that Apple has endowed it with many unusual ones. There is a folding handle for carrying the computer. When you are ready to use the machine, you bend the handle and it becomes a foot to incline the //c in a comfortable typing position.

APPLE //c Keyboard

The keyboard is a typewriter-standard, full-travel one, with sculptured keys and a good "feel". You get both tac-

tile (feel) and audible (click) reinforcement when you press a key. This is the kind of keyboard usually found only on expensive machines. We are sure that the design team labored over the keyboard since the IBM PCjr's keys are counted as one of its faults. There is one feature that is not obvious on the //c keyboard. It appears to be a standard QWERTY (also called Sholes) keyboard. However, if you press a small button on the top panel with a pointed object, the keyboard becomes a Dvorak keyboard layout. We don't know if this is better than QWERTY, but a lot of people say it is. If you are not a Dvorak expert, you will have to remove the keytops and re-install them in the new ar-

range. Apple says they will come out with a set of pasties to re-mark the keys for Dvorak arrangement.

The layout is identical with that of the Apple //e so experienced Apple // users will feel perfectly comfortable with it. Since the //c will be used in all kinds of places where people work, eat, and play, there is a danger that liquids and things like peanut butter will be applied to the keyboard. Not to worry says the //c design team, we have a plastic layer under the keys to stop the goopy stuff. The liquids will run out of the vents when the computer is set up to work with the handle in the bent position.

APPLE //c Disk Drives

The 5 1/4-inch internal disk drive peeks out of the right side of the //c and is a half-height unit with an unusual door arrangement. You press IN to open the drive door. Next time you press-in it pops out the diskette so you can remove it. If you haven't used one of the Apple half-heights, you will be happy to hear that they make a lot less noise than the old coffee grinders in the Apple II and II Plus. There is also a built-in disk access lamp that illuminates when the disk drive is being accessed. One problem that remains in the Apple // family is the 140K capacity of the disk. When you are using ProDOS or Pascal you have 137 kbytes available, but when

you are using Apple DOS you only have 124 K. This is not much by today's standards but it could not be changed without making the system incompatible with the Apple // family. You can at least plug-in an external drive for \$329.

APPLE //c Video Display

The Apple // and Apple /// are well known for the variety of their video displays. While other computers might have higher resolution in one mode or the other, the 8-bit Apples have it all! In this latest child of the family they have provided the following video modes:

40-Column text, by 24 lines down

80-Column text, by 24 lines down

The text display is selectable by a switch on the upper front panel. The 40 column mode is selected when the RF Modulator and a TV are being used. The 80 column mode requires a monitor. It should be noted that when the flat panel display is used, it will display 80 characters by 24 lines.

As with other members of the Apple // family, there are two color graphic modes:

Low-Resolution graphics (40 by 48), 16 colors

High-Resolution graphics (280 by 192), 6 colors

Apple has also provided a Ultrahigh-resolution graphics mode somewhat akin to that on the Macintosh. It is 560 by 192 pixels, but it is only monochromatic.

Continued on page 7

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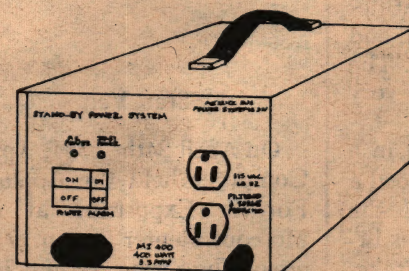
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Apple //c

Continued from page 6

The text video attributes provided for the //c include:

Normal- white dots on a dark screen.

Inverse- dark dots on a white screen.

Flashing- alternating normal/inverse.

Mouse text- 32 special graphics characters in ROM.

Inside the Apple //c there is a single PC board continuing the complete circuitry. The CPU is an 65C02, which is a CMOS version of the 6502. This provides compatibility with preceding models. The user RAM has been extended to 128K which compensated for the lack of plug-in memory boards. In addition the chip count has been kept very low by the use of custom LSI chips. There is a MMU (Memory Management Unit) chip which controls the addressing of the memory. The I/O is controlled by the IOU (Input/Output Unit) and the timing by the TMG (Timing Generator). Other logic functions have been cast into the GLU (General Logic Unit). One of the most interesting LSI chips is the IWM (Integrated WOZ Machine) which condenses the entire Apple // Controller Board into one LSI Chip! Although there are no 'slots', in the //c, the software thinks that the drives are #1 and #2 plugged into a controller card in Slot #6 in an Apple //. It is this little deception that makes all of the software compatible with the //c. Since there is only one IWM Chip in the computer, only two disk drives can be connected.

APPLE //c Rear Panel

All of the peripherals for the //c plug into connectors on the rear panel, that is the only way to connect into the computer. There is one DB15S connector for the Video Expansion Connector socket. The External Disk Drive Connector uses a DB19S connector. In addition there is one DB9S connector which is used by either the Joystick, or the Mouse, one RCA connector socket for the Video Monitor cable, and three DIN connector sockets. These are used for the Power Supply Connector, the Modem and the Printer/Plotter. The last two actually are serial ports, but in place of a standard RS-232C cable these non-standard cables are used. Since the Apple //c will be sold all over the world, picture icons of the port functions are shown rather than English titles.

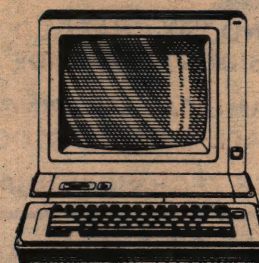
APPLE //c Power Supply

The main power supply of the Apple //c is external to the computer case. This has several

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Continued on page 9

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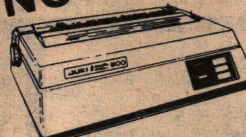
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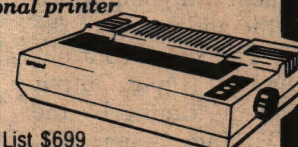
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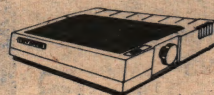
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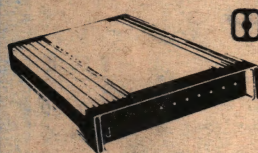
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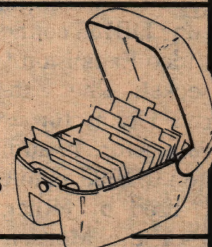
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Apple //c Continued from page 7

advantages. First it makes the small size of the //c possible. Second, it reduces the heat within the cabinet so that no fan is needed. Third, since the power input to the computer is 15 volts DC at 25 watts, it can be supplied by various external power supplies to fit the country of operation. It can also be supplied by a battery pack to make the //c completely portable when the flat screen is released. In the United States and Canada the power supply will be a unit that operates from 105 to 129 volts AC and converts it to 15 volts DC.

APPLE //c Software

Apple Computer claims that 90% of 10,000 programs for the Apple // family will run on the Apple //c. While we agree that there is a fantastic amount of compatible software available, we feel that there is a problem with a lot of it. Software that depends on special plug-in boards such as AD/DA Converters, Plug-in Modems, IEEE Interfaces, CP/M Boards and other CPU's will not work in the //c. That accounts for the 10% that Apple says will not work. However there is a huge amount of software that will RUN on the //c, but will not print anything because it looks to Slot #1 for output and expects to find a Centronics parallel interface board in that slot. The Apple //c on the other hand has no parallel interface and expects software to look to Slot #1, or Slot #2 filled by an Apple Super Serial Board. The serial ports on the rear panel look like this interface to the software. Now there are thousands of programs that expect the printer to use a Centronics interface. These will not work on the Apple //c unless the publishers modify the I/O section.

Apple Computer has locked out Orange Micro, and all the other vendors of plug-in parallel interface boards. They have also locked out the manufacturers of plug-in modem boards. Printer manufacturers such as Epson, Star Micronics, Oki, and

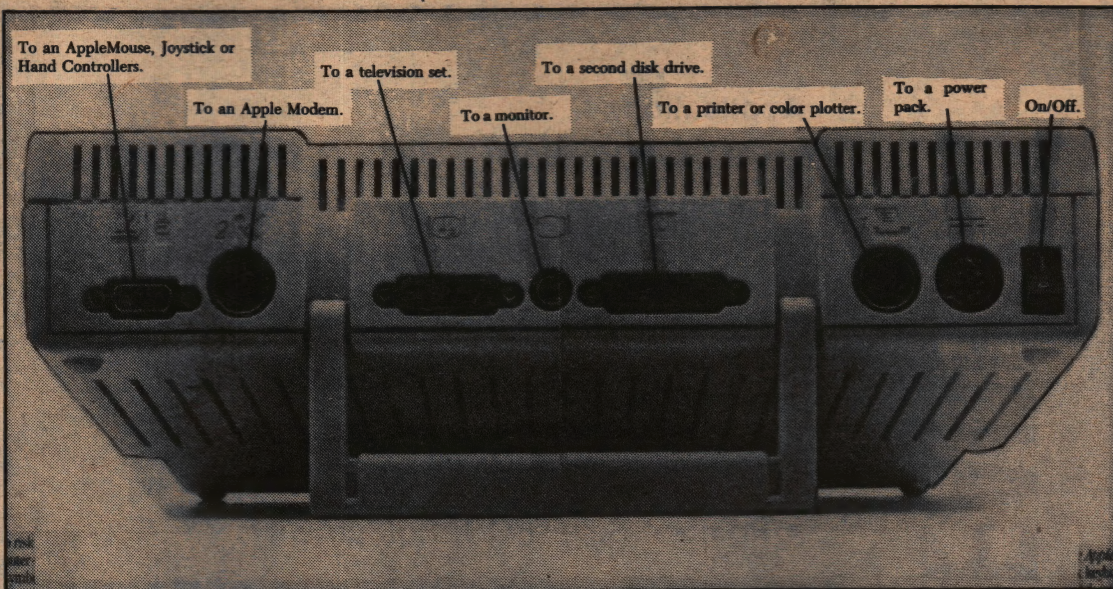
C. Itoh will have to supply only their serial versions to be used with the //c.

On the other hand there are a large number of software developers that are busy developing new software, or adapting old software to utilize the extended capabilities of the Apple //c. The use of the Mouse and the Ultrahigh Resolution graphics alone will inspire hundreds of new software systems.

Learning To Use The APPLE //c

The manuals for the new computer are first rate and there are so many Apple //c Guides being published that it will fill its own 6-foot shelf. In addition Apple gives the buyer a set of 6-diskettes that will teach everything that is needed to use the computer.

After spending a day with the Apple //c at the Expo where I had a chance to try all of the new peripherals and a lot of the new software, I must admit that I am a believer. This machine will extend the life of the Apple // family by years. It is going to drive parents nuts as their kids are taught how to get them to spend 1,300 bucks on it! It is also going to change the way that Apple sells computers! Nothing was said to the loyal dealers at the meeting, but given the fact that John Sculley is a package marketing wizz and Apple is in a fight to the bitter end with IBM, you are going to see the Apple //c in every mass market outlet when the factory production comes up to speed. The very package design of the complete starter set says "K-Mart" to me. It may not happen overnight, but watch it! What's that, you say, the price of \$1295 is too high for a mass market item. You are right, and the price will come way down. When you don't have too much of something, you charge a high price for it. Then when you have a lot and reduce the price, everyone thinks they are getting a bargain and they buy. What is keeping the price up right now is the cost and low yield of the special chips. When they get them rolling,



Apple //c Rear Panel.

then watch out IBM and Commodore!

Apple has outflanked the Taiwan Cloners. They can't copy this one! They have also forced IBM to hurry up with PCjr II, you remember the one I predicted months ago, with more memory, a decent keyboard and two disk drives.

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Many uses. Perfect for the simultaneous key strokes and control characters used in the "Wordstar" word processor; as suggested in Pfister's article on page 346 of the February issue of "BYTE". Will operate three keys independently if desired.

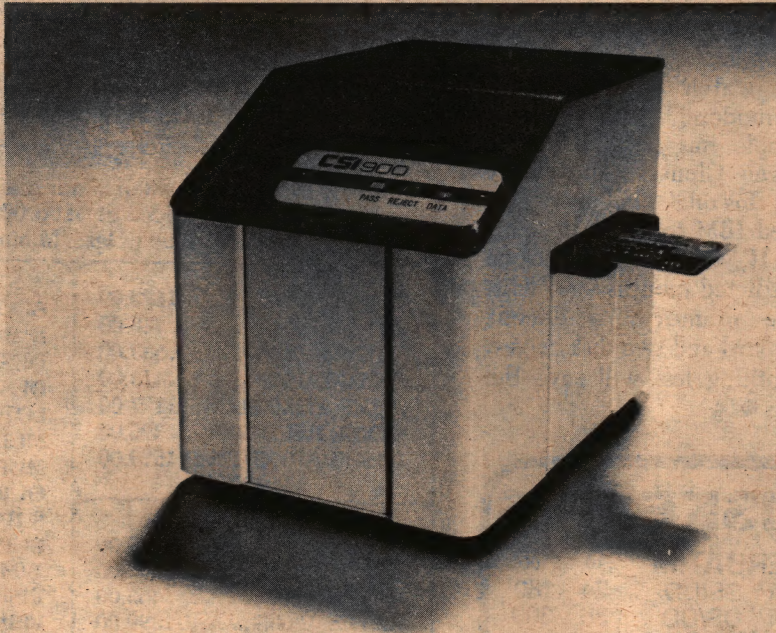
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Apple // Forever

Continued from page 5

scattered all over the hall, reached down under their chairs and came up with Apple //c's. Everybody in the place was able to touch the computer and try the keyboard and get a close look at all its features.

After the excitement was over, John Sculley, President of Apple took the stage to tell the dealers the price (\$1295), the Marketing program (11.5 Megabucks) and the fact that they could go home with a computer for \$400. The dealers loved it! He also said that they could get a shipment of 10 units by the end of the week. The dealers went wild at that news.

That was not the only thing that went wild at the meeting. As the people were leaving the hall, the whole building started to shake and the earth trembled. We were in the middle of a San Francisco earthquake! When the shakes stopped, everybody wondered how Steve Jobs had arranged that!

Since the new baby is truly an Apple //, there are 10,000 programs that will run on it at its birth. In addition there are many new programs written to

take advantage of its super high resolution graphics. These were on display in the Expo Hall next to the introduction area.

After the big show, the Apple // Team was made available to the press for pictures and questions while the dealers held private meetings with Apple sales staff.

The Expo was enough to keep the interest of the attendees for the rest of the day. Apple fed everybody at lunch at the show and dinner at one of several area hotels. Then back to Moscone Center for the evening's program by Herbie Hancock and his band. It was a rousing send-off to an exciting day. I thought that the hoop-la over Macintosh was the ultimate, but that was before Apple // Forever. The entire proceedings had the feeling of political convention, or a religious revival. It was very hard to leave the day's proceedings without becoming a convert to the Apple cause. They are casting themselves in an underdog position to the giant IBM. A David vs Goliath in the battle for the microcomputer market and we always root for the underdog. When asked what Apple's tactics were in the fight with IBM, an Apple spokesman said, "Every time the elephant puts its foot down, we will be somewhere else." Before the introduction of the IBM PC jr, not many people in the industry would have believed this could be done. With the introduction of the Apple //c, the advantage is clearly Apple Computers. We are all waiting for the next volley. ●

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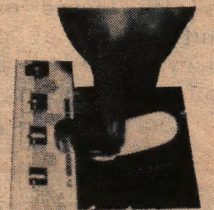
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- 5 1/4" Hub-Reinforcer Kit: positioning tool for Hub Opening 10.95
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- 5 1/4" Hub-Reinforcer Rings: 50 rings for Hub Opening opening 5.95
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Add \$2.50 for P & H. (AK, HI, PR, Canada add \$5 P & H. Int'l orders add USD10 P & H. MA res. add 5% Tax. Send check, money order, VISA, MC:

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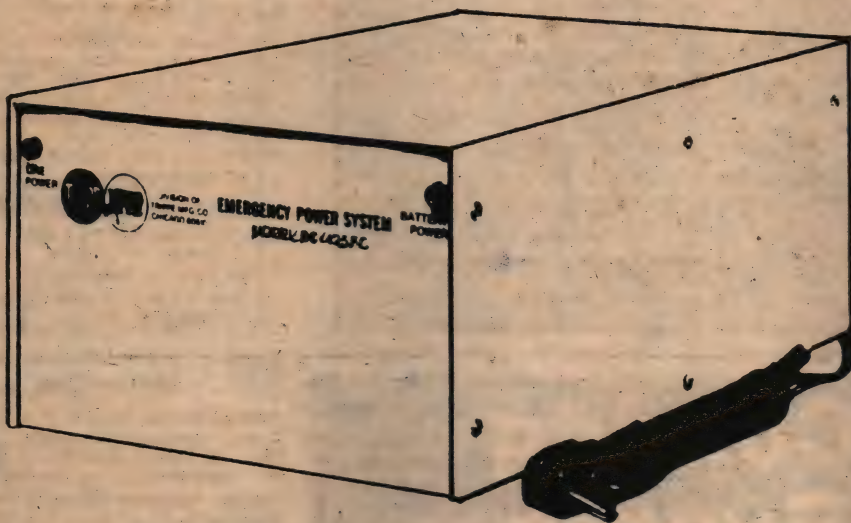


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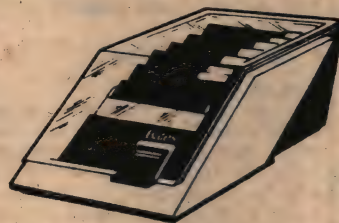
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Coming Events

If you know of or have a trade show, swap meet or club meeting connected with the computer field, we'll run an announcement in the COMING EVENTS section FREE of charge.

JUNE 1984

JUNE 4-8, 1984

The 13th Annual Conference of the MUMPS Users' Group will be held at the Adam's Mark Hotel in Philadelphia. For further information call 301/779-6555 or write Conference Dept., MUMPS Users' Group, Suite 308, 4321 Hartwick Road, College Park, MD 20740.

JUNE 8-10, 1984

1984 Kansas Computer Exhibition and Robotics Conference, to be held at Century II Convention Center in Wichita Kansas. For more information contact: Wichita Group Inc., PO Box 47186, Wichita, KS 67201. 316-269-1022, c/o Ron Holmes.

JUNE 9-10, 1984

The Computer Supermarket is a two-day personal computer show where thousands of products will be available for immediate purchase by show attendees. The show is open from 10AM to 5PM both days. Admission is \$6. For exhibitor and show information, call or write MICROSHOWS, PO Box 4323, Foster City, CA 94404. Telephone 415-571-8041.

JUNE 14-17, 1984

"C '84" International Computer Show. For more information contact: American Embassy, Foreign Commercial Service, Deichmanns Ave 29, 5300 Bonn 2, West Germany, Telex: 885455, c/o Mr. John Lumborg, Phone 0228/339-2266 or Ms. Karen Willamowski, Phone 0228/339-2761.

JUNE 15-17, 1984

9th Annual MACC Computerfest. To be held at Dayton Convention Center. For more information write: Computerfest 84, PO Box 24505, Dayton, Ohio 45424.

JUNE 17, 1984

EPISTAT '84.

A national conference on Interactive Computer Software for Epidemiology and Statistics. To be held at the Earle Brown Center of the University of Minnesota in St. Paul. For further information, vendors and participants should contact Anne Dickason, Dept. of Con-

ferences, University of Minnesota, 209 Nolte Center, 315 Pillsbury Drive, S.E., Minneapolis, MN 55455 or call (612) 376-7281.

JUNE 21-23, 1984

Great Southern Computer Show, Jacksonville, FL. For more information contact Great Southern Computer Show, Box 655, Jacksonville, FL 32201 or call (904) 356-1044.

JUNE 23-25, 1984

The National Conference on Computers in Medical Practices, to be held at California Masonic Memorial Temple, Nob Hill, San Francisco, CA. Exhibitor information: 415-931-0910 Marie Kelly; General Registration: 800-445-2121 California, 800-468-2211 All other states; Joint Venture Information: 415-931-3736 American Computer Association.

JUNE 26-29, 1984

Government Computer Expo 84. To be held at the Sheraton Washington Hotel, Washington, DC. For more information contact: U.S. Professional Development Institute, 1620 Elton Rd., Silver Spring, MD 20903. Phone 301-445-4405. Exhibitor Information: Management Directors International, 102 W. Church St., Frederick, MD. 301-695-9588.

JULY 1984

JULY 8, 1984

3rd Annual National Conference of the Association for Women in Computing, to be held at the Holiday Inn Center Strip, 3475 Las Vegas Boulevard South, Las Vegas, NV. Registration forms and additional information are available from AWC Conference Registration, Patricia Timpanaro, 40 Main Street #206, Stoneham, Mass. 02180.

JULY 27-29, 1984

Heath/Zenith Users Group International Conference, to be held at Pheasant Run Resort in St. Charles, IL. For more info call or write: Heath Users Group, Hilltop Rd., St. Joseph, MI 49085. 616-982-3463.

JULY 28-29, 1984

Western North Carolina Hamfest and Computer Faire
Hamfest to be held at the Buncombe County Fireman's Association Training Center in West Buncombe County near Asheville. For more information write Ed Erwin, WW40, P.O. Box 835, 120 Clayton Rd., Arden, NC 28704

AUGUST 1984

AUGUST 2-4, 1984

Great Southern Computer Show. Charlotte Civic Center, Charlotte, NC. For more information contact Great Southern Computer Shows, PO Box 655, Jacksonville, FL 32201, or (904) 356-1044.

AUGUST 26, 1984

The Central Pennsylvania Repeater Association Inc., 11th Annual Hamfest/Computerfest.

To be held adjacent to Hersheypark, Chocolate town, USA, Hershey, PA. For more information contact Barrie L. Schwartz, W3ENL, Hamfest Secretary, 3545 September Drive, Camp Hill, PA 17011, (717) 763-8728.

SEPTEMBER 1984

SEPTEMBER 7-9, 1984

HAM-O-RAMA

To be held at the Erie County Fairgrounds (Buffalo Raceway), Ham-burg, NY. For more information write L.J. Keller, Vendor Chairman, Bowen Road, P.O. Box 6, Elma, NY 14059

SEPTEMBER 14-16, 1984

The Heart of Texas Computer Show. Scheduled to run 3 days at the Bayfront Plaza in Corpus Christi, TX. For more information write Heart of Texas Computer Show, P.O. Box 12094, San Antonio, TX 78212 or call (512) 681-2248.

SEPTEMBER 20-23, 1984

Userfest/New York
To be held at Madison Square Garden in New York. For more information write or call Northeast Expositions, 822 Boylston Street, Chestnut Hill, MA 02167, (617) 739-2000.

OCTOBER 1984

OCTOBER 12-14, 1984

2nd Annual Heart of Texas Computer Show.

To be held in San Antonio, TX at the Convention Center. For more information write Heart of Texas Computer Show, P.O. Box 12094, San Antonio, TX 78212 or call (512) 681-2248.

OCTOBER 16-18, 1984

The West Coast Electronic Office Expo & Conference (EOE '84).

To be held at the San Jose Convention Center, San Jose, CA. For more information write or call Cartledge & Associates, Inc., 4030 Moorpark Ave., Suite 205, San Jose, CA 95117 or call (408) 554-6644.

OCTOBER 28-31, 1984

The National-American Wholesale Grocers' Association's All Computer Conference & Exposition.

To be held at the Loews Anatole Hotel in Dallas, TX. For more information contact National-American Wholesale Grocers' Association, 201 Park Washington Court, Falls Church, VA 22046

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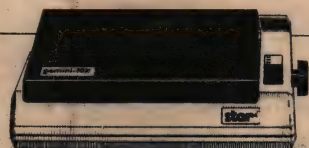
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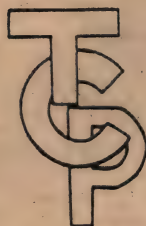
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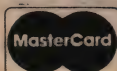
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A Portable Computer RoundUp

Ever since the personal computer revolution started, people have wanted to do two things with small computers. First they wanted them to sit on their desk, ready for any task they were called upon to do. Second, they wanted to be able to pick the computer up and take it wherever they went. The personal computer was able to do both of these things ever since its invention. You could take the Apple 1, and build it into a attache case and many users did just that. However you still had to connect it to AC power and a TV set, or monitor. The Osborne 1 Portable was the first self-contained computer system that became popular (if you could call 30 lbs Portable). It

started the class of computers that we now call 'Transportable'. It is said that the Osborne sold in spite of its portability, not because of it. It was mainly a lot of computer and software for a small price.

Today almost every major computer manufacturer makes a transportable version of their computer. One of the reasons that these have sold very well in spite of heavy competition is that the manufacturers have followed the lead of Osborne and included complete software packages at no extra cost. This has made the portables an excellent buy for users. The following table lists some of the most popular transportable computers. All prices are list.

Name	Manufacturer	Type
------	--------------	------

Actrix	Actrix Computer Co.	CP/M, MSDOS
This 33 lb. machine includes a 7-inch amber screen and a dot matrix printer. It comes with 64K RAM and sells for \$2,190.		

Macintosh	Apple Computer Co.	M68000 OS
The Macintosh has been reviewed in the March issue. It weighs 16 lbs. has 128K RAM, 9-inch CRT Mouse I/O.		

Apple //c	Apple Computer Co.	AppleDOS
See article elsewhere in this issue.		

MPC-VP	Columbia Data Products	MSDOS
This PC clone sells for \$2,995 and has a 9-inch CRT and 128K of RAM.		

SX-64	Commodore International	C-64
This is the portable version of the Commodore 64. It includes a 5-inch Color CRT and a disk drive. It weighs 27 1/2 lbs. and lists for \$995 (although it retails for much less than that.)		

Compaq	Compaq Computer Corp.	MSDOS
The Compaq Portables were the first MSDOS portables and they are the most popular of them. This 28 lb portable has a 9-inch monochrome CRT, or an external color CRT. The price has just been reduced to \$2,000. The Plus version includes a Winchester hard disk.		

Corona Portable PC	Corona Data Systems	MSDOS
The Corona is a 28 lb PC-type portable with 128K RAM and two disk drives. It has a 9-inch green CRT.		

Eagle Spirit	Eagle Computer	MDDOS, CP/M-86
This is a hard disk version with a 9-inch green CRT. It weighs in at 32 1/2 lbs. Cost in the \$4,000 price range.		

IBM Portable PC	IBM Corp.	
This is IBM's portable version of the PC. It has two disk drives and an amber 9-inch CRT with external color capabilities. It sells for \$2,795.		

Kaypro 2	Kaypro Corp.	CP/M
This 26 lb. portable sells for \$1295 with full complement of software. It has two disk drives and is the most popular 8-bit portable now built.		

Kaypro 4 This model has recently been improved with a built-in modem and other internal improvements including graphics. The price is now \$1,995 including the inclusive software package.

Kaypro 10 this is the Winchester hard disk version of the



Visual Commuter MSDOS Portable Computer.

Kaypro line. It sells for \$2,795 including the 10 Mbyte disk.

Attache	Otronia Advanced Systems	CP/M
This 19 lb. portable has 5 1/2 inch CRT and small but usable keyboard. Very well built and popular.		
Attache 8:16		CP/M & MSDOS

This model adds a 8088 CPU and up to 256K RAM to run either CP/M or MSDOS. It lists for \$3,795

Sr. Partner	Panasonic	MSDOS
Reviewed in May issue \$2,795.		

Chameleon	Seequa Computer Corp.	MSDOS
We got one of these to review. It did not work, so we sent it back. They never returned it to us. It sells for \$1,995. We have had varied reports from others, some bad, some fair.		

TRS-80 Model 4P	Tandy Corp.	TRSDOS, CP/M
The portable version of the excellent Model 4 weighs 26 lbs. costs \$1,799 with two disk drives, 64K RAM.		

TPC-I	Televideo Corp.	CP/M
This portable comes with software package for \$1,699. Weighs in at 26 lbs. Has 64 K RAM 9-inch amber CRT.		

TPC-II	Televideo Corp.	MSDOS
This is a 16-bit version costs \$2,995.		

Professional Port.	Texas Instruments	MSDOS
Portable version of Professional Computer, weighs 33 lbs. and costs \$2395. Nine-inch CRT.		

Z-160	Zenith Data Systems	MSDOS
Portable version of Model 100. Priced at \$2,799.		

The next group of portables are the hand held computers made by Sharp, Casio, Hewlett Packard, Panasonic, Quasar, and Texas Instruments. They were really an outgrowth of the pocket electronic calculator which had been given more memory and taught to speak BASIC.

The major problem with these clever machines was that the keys were small, the display only showed one line, and the memory capacity was very limited. Still they found specialized applications and did a good job. For example: If you fly on People Express, the low cost airline, the

customer service representative comes through the aisle collecting the fares and recoding the transactions on a Sharp 1500. Other applications are meter readings for fuel oil, electric and for service technicians. In spite of this special utility, this type of portable computer has just sold enough for the manufacturers to keep making them.

One function introduced by the hand held was portable communications. The Link sold by Panasonic/Quasar and Olympia had the ability to be connected to a modem thereby converting it into a hand held terminal that could upload, or download software with a remote computer.

The current versions of these are listed below:

Continued on page 16

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Portable Computer RoundUp Continued from page 15

Hand Held Portables

FX-700P Casio Computer Corp. BASIC
This 6 1/2" by 2 3/4" portable weighs 4 1/2 ozs. and has 2K RAM and 13K ROM. One line by 12 character display. FX802P More powerful version with 26K ROM.

HP75C Hewlett-Packard BASIC Portable
This powerful hand-held computer is part of a full system which includes a printer and a digital tape drive storage device. The HP 75 can be connected in a Loop interface to control these devices and other equipment. A BAR Code reader can also be used with the computer. It has 16K RAM and 48K ROM but can be expanded with plug-in modules.

HP 75B - This is a simpler version of the HP 75 Series. It only has a 22 character display. It comes with 17.5 K of RAM, but like the 75, it can be expanded to 32K of RAM and 64K ROM Modules can be plugged-in. The HP 75B can also interface with the same line of peripherals used by the HP75.

Link Panasonic/Quasar-Olympia 16K
This hand held is sold under several names can function by itself but can be plugged into other modules to form a complete system that has up to 56K of RAM. The display is one line of 26 characters. It also can perform telecommunications and be connected to a full sized video monitor and printer. It does have a portable printer that plugs into the unit as well as a cassette interface. The Link accepts plug-in ROM modules that supply programs as part of the system.

Sharp 1250A 3.5K RAM 24K ROM BASIC
This pocket computer has a one line, 24 character display. It connects to a small printer and cassette recorder. This is the smallest portable full computer.

Sharp 1500A 8K RAM, 16KROM BASIC
This portable has a one line 26 character display. It connects to a four-color printer plotter and cassette interface

which works with the built-in software.

PC-2A Radio Shack Same as Sharp 1500A
PC-3 Radio Shack Same as Sharp 1250

CC40 Texas Instruments 6K RAM, BASIC
This is a TI hand held computer, it has 1 line by 31 character display and weighs 22 ozs. The CC40 has a full range of peripherals. It costs \$250.

The Lap or Notebook Computer is the next sized portable and can be said to be the most successful of the real portable units. It has a real keyboard and enough computing power to supplement desk top computers. It has been predicted that this type of portable will experience the largest growth in the industry and may replace some personal and desk top business computers in the near future.

The Epson HX-20 was the first lap sized computer. It has a keyboard that is almost full sized, a respectable complement of memory and 4 line, 32 character display. An optional mini-tape recorder and a printer can also be installed on the HX-20. This computer, this model is supposed to be replaced with one that has a full 80 character display. Although the HX-20 was in the field first, it has never been very popular because of the lack of software for it.

Kyocera, a Japanese company has produced two ver-

sions of what has been the most successful lap sized portable. The Radio Shack TRS-80 Model 100 and the NEC 8201 are basically the same computer but each has different characteristics that make it different. The Model 100 has built-in ROM based software for Word Processing, Appointment Scheduling, Address storage and Telecommunications plus a built in Modem. The NEC 8201 uses programs on cassette tape and comes with 23 programs. Because of the fact that the Model 100 uses ROM firmware, there is only room for 32K of user RAM. The NEC unit can use most of the available 64K. In addition the NEC 8201, can except 32K RAM cartridges for data storage. These plug into the computer and can be changed as needed. The 32K of RAM fills up rather quickly in the Model 100 and then the data must be dumped to tape and the memory cleared to enter more data. In the NEC the data can be stored in the RAM

cartridges. Radio Shack has also supplied a Video and Disk interface, but its use changes the computer into a desk top machine.

Both units have excellent keyboards and function keys to enable one key selection of special functions. Many users prefer the triangle arrangement of the cursor keys on the NEC. Both of these units have a 8 line, 40 character display. The characters on the LCD are large and easy to read. The only problem with the display is common to all LCD's, they are very slow.

Continued on page 17

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Motorola	?	Universal Peripheral Controller	\$1,500 pair
Motorola	M68KVM21	Disk Interface Module	
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Motorola	M68KEXTM	Extender Cards	\$200
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Portable Computer RoundUp Continued from page 16

Athena I Athena Computer Co. 64K CP/M, Pascal

This portable includes an external disk drive, and both spreadsheet and editing software. It has a 16-line, 80 character display and a 512K solid state RAM-disk. The price of this system is \$3,900.

Workslate Convergent Tech 16K, RAM Spreadsheet

This is an interesting concept. It is a portable spreadsheet computer. It works on the idea that most business use of such a machine will be spreadsheet oriented. The Workslate also has communications capability, but not programmed like the Model 100. It has 16 line 46 character display and a microcassette for storage.

Mobile Computer Gavilan 64K RAM, MSDOS

This portable is IBM compatible, has 8 line, 80 character display and a built-in 360K floppy disk. It features touchpad cursor control and comes with WP, spreadsheet software and communications software. A plug-in printer is also available. This is a true mobile computer and costs \$3,995.

Compass GRID systems 256K RAM, MSDOS

This is the ultimate portable. It has a 24 line by 80 character display, a 384K Bubble Memory and is compatible with the IBM PC. It costs \$8,150 but a price reduction is expected. The GRID is the machine that all others are measured against.

Road Runner Micro Office Systems 48K, CP/M

This machine has a 8-line 80 character display. It comes with CP/M, text editor, and terminal programs. Mass storage is by a plug-in RAM cartridge. It sells for \$1,695.

PC5000 Sharp 128K RAM, MSDOS

The Sharp 5000, weighs under 10 lbs. and has two 320K floppy disks plus a built in printer. The screen is 8 lines of 80 characters each. It is IBM Compatible and sells for \$1,995. This computer seems to have many of the capabilities of the higher priced models at a much lower price. We rate it as a Best Value.

Toshiba T100 64K RAM, BASIC

Another lap portable with a 8 line by 40 character display. Sells for \$1,365. Has some software.

Commuter Visual Computer 128K RAM, MSDOS

This IBM Compatible portable has either a 40 by 25, or 80 by 25 monitor display. The main portable display is a 16 line by 80 character LCD display. There are two half-height disk drives of 320 K each and one parallel and one serial I/O port. The RAM memory is expandable to 512K bytes and the computer can be connected to an IBM expansion chassis. The Commuter is designed to replace the 30 lb suitcase type portables and to this end it sells for \$1,995 which is inexpensive for an IBM compatible.

What Is Ahead For Portables

This is the year of the lap, or notebook portable. Kaypro and Mitsui the large Japanese manufacturer are about to introduce a 16-bit MSDOS Computer, HP has already announced one (see elsewhere in this issue). The Lap, or Notebook sized IBM Compatible with either 3 1/2-inch disks, or 3 1/4-inch disks will take the spotlight from some of the heavy lugables. It is rumored that Big Blue will enter the field with a machine. If so they are not talking about it. The heavy IBM Portable which is a collection of stuff from other machines can not be their effort! It is a machine whose father was an IBM XT and

mother was an Osborne! They got to be able to do better than that!

Radio Shack is expected to upgrade the world beater Model 100 to 80 characters per line. They will not answer questions about this, but they are running sales on the Model 100. Ft. Worth watchers say that this is always a sign that a new model is about to be introduced.

NEC is supposed to add small disks to their portables.

The flat panel display for the Apple IIc will be out this fall and it will make this small giant a strong contender for the market lead. It will be an interesting portable year. Watch it! ●

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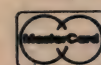
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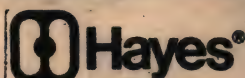
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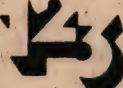
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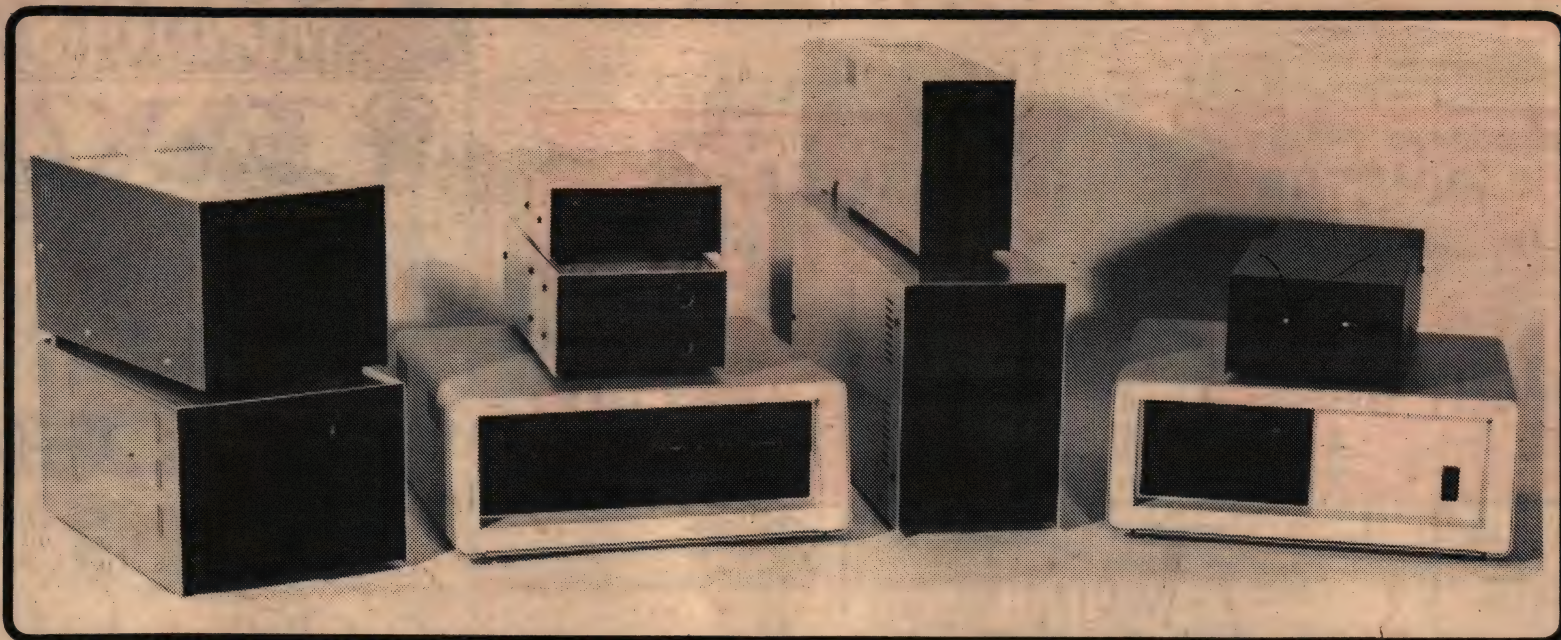
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Once again we start the Show Season, it happens every spring and we can expect the introduction of new products in both software and hardware. This year the trends in hardware point to innovation in portables rather than desk top machines. Flat screens, built in disk drives, and popular software cast in silicon (ROM-based), will be the rule for these new machines. Apple //c and the nine pound Hewlett-Packard Portable are setting the pace. Although the HP machine lacks the disks, it has enough RAM to serve as a "RAM-disk".

I have been a portable computer user ever since they started to appear on the market. I started with a Sharp 1500 Hand Held, then I got a Panasonic LINK outfit, an Epson HX-20 and finally a Radio Shack TRS-80 Model 100. Frankly they have all been a disappointment in one way or another. Perhaps the wonders of technology have caused my level of expectations to be way too high. In spite of this, I have been able to work with all of these portables and the Model 100 really has been a work horse for me.

I feel that this summer will be the first "take your computer along" vacation period. True the really new machines will be first arriving in the stores, but the ones that are here will be getting a work out.

Computer Camps for kids and adults will have their best year yet. A lot of people will get their first introduction to personal computers on vacation this year. As for me, I'm going fishing, as soon as I deliver the manuscript for The Peripherals Book.

I have talked a lot about the coming MSX low cost computers from Japan and what they will do to the market. The first ones should appear at the Consumer Electronics Show this spring. Randy Holcomb will cover this show for me and he is going to look at the developments in MSX

and other Low Cost Computers. The news should be exciting.

Next month we're going to talk about LAN (Local Area Networks) and discuss the pros and cons of them. At the same time, we may be having one installed here at The Computer Shopper. It is called The Pipe and it has the unique ability to connect all the diverse equipment we use. It should prove to be an interesting experiment. I am not quite convinced that LAN's are necessary. The expensive resources like large capacity hard disks, and high speed printers keep getting cheaper faster than the LAN's. You don't have to share a 20 Mbyte disk among a group of computers anymore. You can connect one to any computer that needs it, for about the same price as it costs to make the computer a LAN Node! I would like to get some

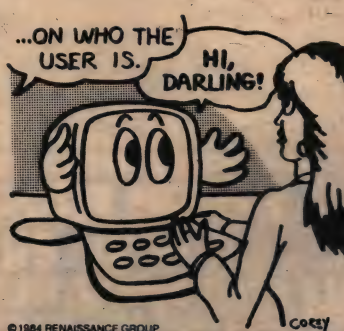
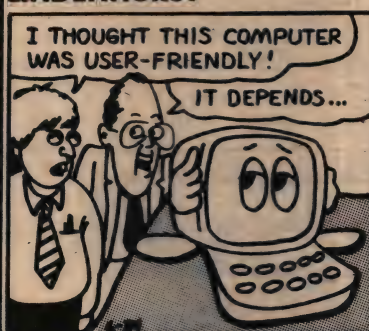
reader feedback on this question. Some of you must have LAN experiences to share. If you write them down and send them along to me, I will print them in FeedBack Forum (and pay you for it!).

As an example of the advertising power of the Computer Shopper, last month I advertised

for a replacement for our TRS-80 Columnist. I received several answers from highly qualified writers. Starting next month we will have material from several knowledgeable people on the entire Radio Shack (Excuse me, TANDY Computers) line. I want to have coverage on the Model

12/16 as well as the more popular Models 1 through 4. The portables will not be ignored either. If you think you would like to write about one or more of these computers, please write to me and tell me about it. I am also still looking for people to write about HP Computers. ●

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The Home Computer Users Column

by R.E. DeVore

I owe the Apple owners an apology. I had planned to do Apple programs this month, but something happened. I tried one of the games that is described in the column and couldn't quit. Next month I will do solely Apple games and application programs to make up for the slight. However I feel it would pay them to read about these games and to try them when they are available for their computer.

The Apple IIc is out and I will try to obtain one to tell you about it. It looks neat, has 40 or 80 column display built in but there is no provision for CP/M. Sigh. Meanwhile, on to the reviews.

Program Overview
Name: Bruce Lee
Type: Fantastic
From: Datasoft

Since Bruce Lee was considered one of the greatest martial artists, then it would seem

only fitting that the game "Bruce Lee" should come up to the same standard. I think it does. Read on and find out why.

An evil wizard has been terrorizing a local province and you, as Bruce Lee, have volunteered to rid the area of him, incidentally also gaining the secrets of immortality and infinite wealth. You've been told that pulling down the numerous magic lanterns will remove the iron grates that separate one area from another.

Evading the traps and tricks in the wizard's lair would be difficult enough without the legion of Ninja warriors and hulking green Yamo fighters... (Lee landed softly on the inner terrace. The outer guards had presented no problem to one of Lee's skill, but he had yet to face any of the elite that patrolled the palace.) (There was one of the lanterns he had been told about. Lee jumped up to grab it, and found that it vanished in his hand. He had no time to puzzle over it, for he could hear the soft whisper of approaching feet...)

Each screen in this game depicts the colorful architecture of the wizard's palace and underground chambers. There are trellises and vines that Bruce may climb up and around. The joystick controls Lee in a sophisticated manner: while on a flat surface, pushing left and right on the stick will cause the fighter to run left and right, accordingly. Pushing diagonally left and right will make Lee jump in that direction, while straight up produces an according leap upwards. Pushing down on the joystick makes Lee duck, hugging the ground closely. There is no time limit on how long Bruce may duck, although it's not to your advantage to stay that way long.

If Lee is moving, pressing

the fire button prompts a magnificent flying kick. Pressing the button while the fighter is still makes him punch. If Bruce jumps onto a trellis, he may move around, but cannot duck or attack. But, then neither can his opponents.

(Then he saw a Ninja leap down from a roof and run towards him, the black-clad fighter's bokken stick raised in the air. But before it seemed possible, Lee launched himself into the air, his foot connecting with the Ninja's jaw. The Ninja was hurled backward, but came at Lee again. Only one further kick was necessary. Lee tagged another lantern and then froze momentarily as he heard a deep, moaning cry.)

The opponents that Lee faces are numberless, but fortunately they only approach him two at a time. The Ninja is the weaker adversary, requiring only two kicks to dispatch, and delivering such feeble blows that Bruce can withstand about 20 of them before having a fall called on him. (Bruce doesn't have lives, he has falls, as in a Karate match. He starts with five falls.)

On the other hand, the Yamo warrior is not to be taken so lightly. It takes three kicks to eliminate, and about five kicks from the green thing can do Bruce in. The Yamo announces his presence by his characteristic battle cry. (The ground shook as a huge green Yamo wrestler landed on the pavement. Taken somewhat by surprise, Bruce didn't see the foot coming at him. He was shocked to find himself sailing through the air, and hit the ground hard. Getting to his feet, he saw the Yamo coming at him to press it's advantage. Lee ducked under the green foot and saw another Ninja approaching. Timing carefully, he ducked again and heard the two mutual grunts as the Ninja and the Yamo struck each other. Stunned, they could not

Continued on page 28



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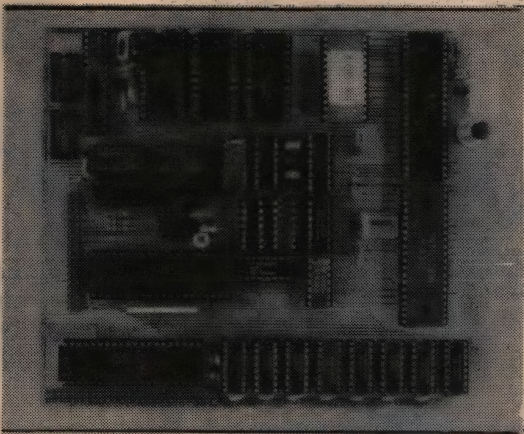
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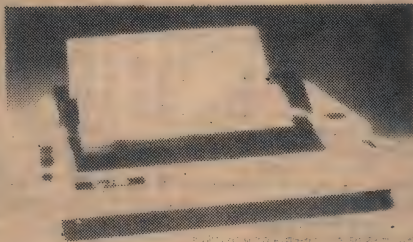
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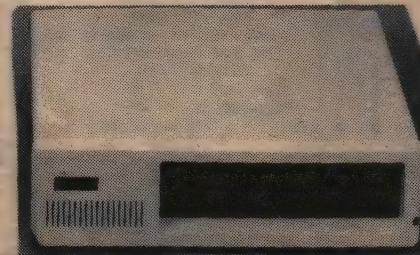
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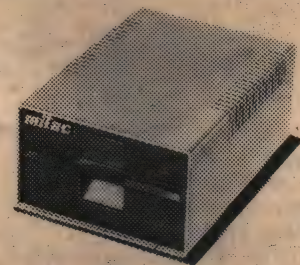
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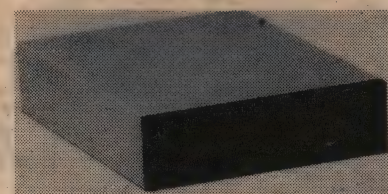
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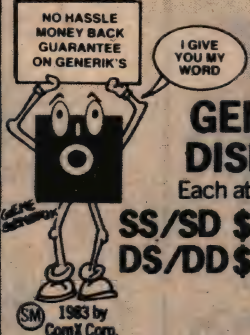
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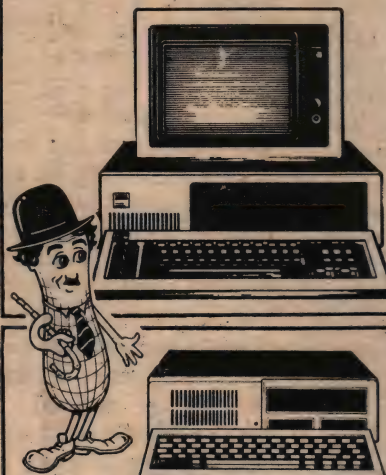
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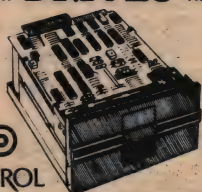
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Continued from page 24**

recover quickly enough to stop Lee from leaping up to the trellis and climbing away.)

The computer controls it's men capably, but not flawlessly. There is a certain delay that seems as if the enemies are listening for Lee (although they do not wait so long on the second level).

After gaining all the lanterns on the top three screens, a hatch opens up to the underlevels of the palace, and things become more complicated...

(Lee looked down the shaft and saw periodic blue-white flashes. He didn't want to jump down into that without knowing what it was. He kicked the next Ninja that appeared into the shaft and saw a blaze of sparks consume the fighter. Electricity! Timing carefully, he held his breath and jumped...)

There are more interesting things going on, but you wouldn't want me to tell you

everything, would you? You would? Oh, I wouldn't spoil your thrill of discovery, the joy of passing through that tough screen, the terrible knashing of teeth as you lose four falls in the same room...

If you navigate the 20 or so screens successfully and reach the wizard, dodge the fireballs coming from his eyes, and push the button on the far side of the chamber, the wizard will be destroyed, the province freed from his iron grip, his palace burned to the ground, and the people will sing Lee's name in praise. But there's this other wizard in this other province... The second level is substantially more difficult than the first, and I don't expect anyone to complete it.

Although some of you enterprising players may fool me. The graphics and animation are excellent. Bruce wears black pants and leather gloves, the Yamo wears that scarf/diaper arrangement that Sumo wrestlers sport. All the characters run, punch, kick,

jump, and fall superbly. The buildings and interior chambers are also done quite well. Fighting produces swishing and whump! noises, and the gratings move aside with a clang.

But that's not all! You may also have two players, where each take a turn controlling Lee, or one player can control the Yamo, or each can alternate. The Yamo can't duck, but produces his battle cry when the stick is pushed down. It's more fun to beat on the Yamo when it's controlled by a person. The Ninja remains computer-controlled in any case.

You can probably tell that I like this game by now. A review can't really transmit the feel this game has. The only possible complaint that one might raise is the rather long booting time that checks the bad sectors on the disk, then displays a title screen and plays a melody that cannot be aborted or skipped. If the music were done less well, the pause might be more annoying. But this is a trivial complaint against a truly excellent product. You will not regret your purchase of Bruce Lee.

Program Overview
Name: Rainbow Walker
From: Synapse
Type: Arcade

Q*bert from Williams has spawned a host of imitators much as Pac-man did in the late '70s. Games that owe something the venerable hopper range from shameless copies to 'I guess that is like Q*bert, now that I think about it'. Rainbow Walker from Synapse ranks among the latter.

The plot of this offering has your on-screen persona, Cedric, hopping upon a rainbow to restore it's colors. The game field shows a flat rainbow curving off into the distance, and the main attractions are the extensive use of color and the scrolling of the rainbow.

But it's never that easy, is it? The rainbow isn't solid, there are holes and whole sections missing. Jumping off the rainbow costs a life. And all sorts of pests want to prevent Cedric

Continued on page 30

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Continued from page 28

from restoring color to the rainbow. So many that one must be quick just to see what made you lose your last man. Some turn the rainbow segments back to gray and are fatal to Cedric. Causing the rainbow to scroll when one of these creatures is next to a hole

will eliminate it. There are also grids on the rainbow that will freeze the pests if Cedric lands on them. There are only a maximum of four grids present, and they break if Cedric stays on them too long.

Other things pick Cedric up and carry him around, two creatures moving left and right, and two up and down the rainbow. Pressing the joystick button will release

Cedric, but don't let go while over a hole. If you don't press the button quick enough, Cedric will be dropped and you lose a life.

If Cedric lands on all of the squares in one column, the colors are locked, and the hopping pests can't turn them back to gray. However, if the bird hovering in the distance picks up Cedric, you lose a life and all the squares go back to gray, locked or not. This seems to be too harsh a penalty to me.

After completing one rainbow, a bonus round begins. Cedric must hop back and forth between three squares that flick on and off. After Cedric falls, pennies fall from Heaven to add up your bonus score. Then the next level begins, more difficult than before.

Trying to play this game will either discourage you or make you buckle down and try all the harder. It's hard to watch for everything all at once. It seems to have a special appeal to the female players. My daughter and her friends enjoy it more than most games.

Program Overview
Name: Encounter!
Type: Arcade game
From: Synapse

Battlezone fans should feel at home with this new offering from Synapse. Encounter! is on the leading edge of point-of-view graphics in its stunning perspective effects. Set on an alien training planet, long abandoned by its original owners, Encounter! pits a single ship manned by the player against remote-controlled saucers and drones. The combat area is located in curved space (which means that one side connects to the other, the three-dimensional equivalent of wrap-around), eight by eight spaces wide, each space marked by a pylon. The joystick controls left and right turns, forward, and reverse; the fire button launches a projectile that looks like a billiard ball. Your control panel has a radar-type display with indicators for the presence of alien drones and saucers. There is a shot marker which lights up to let you know that

Continued on page 32

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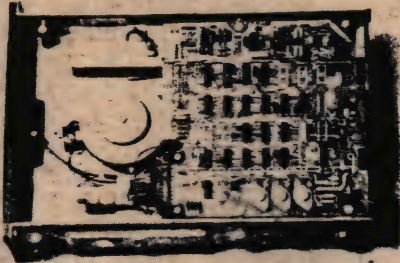
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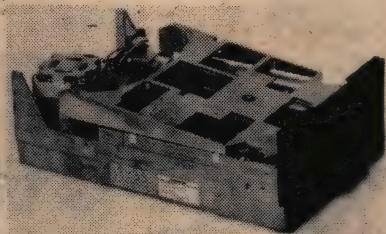
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The Home Computer Continued from page 30

you're being fired upon. Located at the top of the screen are the score, game level, number of enemies left, and shield indicators.

The idea here is to shoot anything that moves. Saucers have a variety of attack strategies, including one that I've rarely seen in any type of game: they hide behind the pylons, a move you'd do well to copy on occasion. A blip on

your radar locates new enemies (which appear one at a time, fortunately). The saucers appear from square portals that approach edge-on, then open. If you're lucky to have a portal come near and in front of your ship, you can blast it early. All that is necessary is to spin around, center the saucer in your sights, shoot it, and watch it explode into spinning diamond-shaped fragments. Easy, right? Well...the first couple of ships are a piece of cake. They don't move around

too much, and they don't shoot. Even when the next ship starts shooting, you just back up and spin at the same time, pull your ship out of the line of fire, and watch the shot go by. Line'em up and shoot'em down. Now, about those drones I mentioned earlier... Every so often, a low... droning sound starts up and a blip on your radar approaches rapidly. These drones swing left and right wildly while homing in on your ship, making it difficult to hit. Drones

will usually move directly in front of you just before impacting, so if you're quick, you can shoot them then. The best tactic is to back up while shooting constantly.

Being hit by a drone or a shot from a saucer produces a spray of color on your screen, and your shield level is reduced by one. Being hit without any shielding left ends the game. If all enemies on a given level are eliminated, a black portal opens up, which you should enter (quickly, it will

not persist indefinitely). Inside some transitory dimension, you must navigate between multi-colored balls that look a lot like saucer shots. Failure to navigate this zone successfully throws you back to the previous level to start again. If you keep your sight clear, this presents little problem. On the other hand, skillful passage through the black zone awards you with an extra shield and access to the next screen. On each level, the terrain and pylon colors, background, and attach characteristics of the saucers change. For instance, one level of saucer lets go about six shots at a time.

The graphics here are just that...graphic! I can't imagine how they could be better. The drive stops when the game is first booted, and I suspect that the time is taken to generate various perspective views. Whipping around pylons, backing away from enemy shots, and to watch explosion fragments spin away, or watching a shot fill the screen, will demonstrate State of the Art Graphics.

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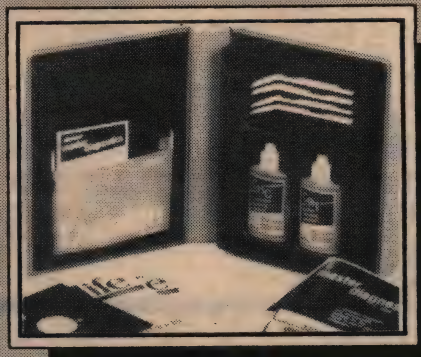
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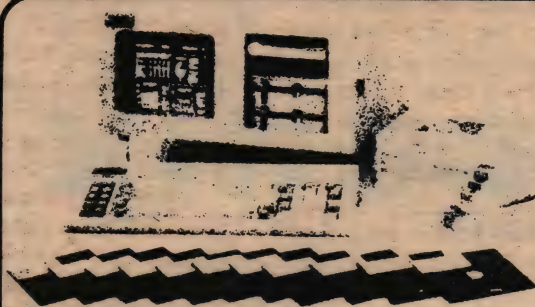
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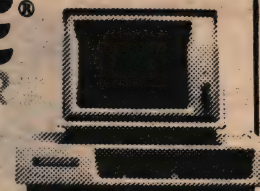
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Getting Started With A Computer

Part II

by Cheryl Peterson

This installment will center around buying a personal/home computer. If you've already got one, don't be too sure this article isn't for you. When I first got my Osborne, I knew it would be all the computer I needed for this century. HAH! We are now a three computer family and are constantly considering expanding. One of my Osbornes is on loan to my over-fifty mother, who is just learning to use it for word processing. Her novel is progressing nicely, thank you. Who says you can't teach an old dog new tricks?

My desk is arranged so that I can switch back and forth between my other Osborne and a Commodore 64.

I prefer to do my word processing on the Osborne. Why? It interfaces best with my printer and I'm most comfortable with the word processing programs I've used on it. Can I use the Commodore for my writing? Yes, but the process is more complicated and time consuming. I have come across some great word processing programs for the C-64. They have all the flexibility and useful commands of the programs I use on the Osborne. BUT, they are designed to be used with a particular kind of printer. I don't own such a unit. Buying one would run me about \$400. Since I have a perfectly adequate system with the Osborne, why spend the money?

The next logical question would be...Why own a Commodore? The C-64 has some marvelous things that the Osborne doesn't. Great graphics and sound capabilities. It runs a fairly standard version of BASIC and has many excellent programs available. There are almost no really nice children's programs for the Osborne. I have a daughter who is almost a year and a half old. Before too much longer, she will be wanting to spend some time in front of the keyboard. I know this because she has already learned to differentiate one key from another. At seventeen months of age, she has stopped the flathanded banging on the keyboard and now pushes one key at a time. I've only had the Commodore for a few months, and it looks like I got it just in time.

The reason I mentioned this is to illustrate the point that

one computer may be great for one application, while another is outstanding in a different area. If you need to do several things with one computer, you may have to compromise in one area or another. Like any other major purchase, comparison shopping can save money and hassles.

So far, I've also pointed out two reasons to consider getting a personal computer. Writing using a word processor and educating your children. If either one is your excuse, you have several options to consider. To be an effective writing tool, your new computer needs to have a usable word processing program and printer. When buying a computer for your children, you need to consider its ability to draw pictures and the quality and cost of educational software for the different machines.

What I'm really trying to get across here, in general terms, is that before you buy a computer be sure you know what you want to do with it. Then check out the machines that will accomplish what you want. At the same time, remember to consider that the computer by itself will not do much of anything. Software and other hardware that you will need later should be planned into the cost of the computer. I highly recommend determining how much money you can afford to spend before you go shopping. Knowing what you want and how much you are willing to spend will help make your choice easier. Set yourself an upper limit and try to stay within it.

In relation to this, there are many good reasons to buy a computer. Having a particular purpose in mind will simplify your buying choices. Some good reasons to buy include word processing, cost analysis, data base management, learning games for children, learning BASIC or other programming skills, and communicating by modem with

others who are interested in the same things you are. Almost all of these activities require some additional expenditures after you buy your computer. Even learning programming on a computer that comes with BASIC requires buying learning aids; books and tutorials.

Some not so good reasons are also floating around. "It'll keep the children busy while I do my shopping." "Maybe I can use it to balance my checkbook or keep track of my car ex-

penses." "It's a tax deduction."

All three of these sound almost plausible. But the kids won't get much out of the computer unless their parents are willing to show them how to use it. Mom and Dad have to make the effort to choose software that will keep the children interested. And youngsters should always have appropriate adult supervision when using the computer. A computer is not a glorified babysitter.

A calculator and a standard checkbook register are still the best way to keep your checkbook balanced. The time and effort necessary to enter all your checks into a checkbook program are only worth the effort if you can categorize the checks and sort them. This would allow you to combine them by categories into useful totals, like deductible business

Continued on page 36

DISK DRIVE MANUAL

Disk drives **MUST** be periodically cleaned and lubricated. Disk drive malfunction due to lack of timely maintenance and/or repair can be extremely costly - loss of irreplaceable programs, data and text - and down time. Professional drive shops are expensive hassles to deal with, and can keep YOU out of business for weeks!! Shipping drives is risky. Most repairs and maintenances can be made in situ by YOU in much less time than it takes to remove, pack, ship, receive, unpack, install, and re-configure drives sent to drive shops. **DISK DRIVE MANUAL** (new edition) describes:

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Getting Started

Continued from page 35
expenses, telephone bills, car payments, mortgage interest payments (deductible from your taxes) and medical bills and insurance, etc. Ditto for the car expenses.

As for the tax deduction, unless you want to have a long chat with the IRS I wouldn't

recommend it. You can deduct a percentage of the cost of the equipment equal to the amount of business use you get out of the computer. This amount must be deducted over a period of five years, since the equipment is considered a depreciable asset rather than a standard business expense. Unless the majority of the com-

puter's time is spent doing business functions, it isn't worth the hassle.

Then there is the "wrong" reason for buying a computer. "Everybody else is buying one." Otherwise known as keeping up with the Jones'. Don't bother. Wait until you really feel you need a computer and want to spend enough time to learn and use it.

Once you've decided why you want a computer, and set some kind of spending limit, it becomes easier to decide what kind of computer to get. My situation points out a couple of other things to consider. Who will be using the computer and when? We chose the Osborne because I needed a word processor and my husband wanted a computer to learn CP/M programming on. He wanted one which could talk to other computers. I needed one that would drive a letter quality printer. And Dale had the foresight to want one that could use a modem. Our Osborne did all these things and came with a good selection of software.

Now for the real revelation! The computer was originally bought mainly for my husband. I didn't think I'd use it much. After all, except for the few things Dale had taught me about electronics, computers were so "dull". And who needs one, anyway.

Poor Dale. He has to book time DAYS in advance to use the thing. In the three years that we've had it, he's used it less than a thousand hours. I've probably used it five times that. Our Commodore was bought out of my earnings and you should have heard me trying to convince Dale that I needed it.

We are not an exception in this. Of the thirty or so friends I have who own computers, at least half of them have bought a second computer. Five of them have three computers. One has four computers for a three member family. It wouldn't be a bad idea to anticipate something like this happening to you. At first, it isn't hard to be accommodating. Members of the family split up the time available to use the computer. But after a while, there just aren't enough hours in the day.

As you can see, buying a computer can quickly develop into a life long endeavor. By the time you decide what you want to do with it, how much money you want to spend and which one is for you, someone announces a new, improved model that sounds even more enticing. So you decide to wait until its available. Wrong move. Computers will always be improving and coming down in price. But the amount of money you save is seldom worth the computer experience you miss.

Example...If I'd waited a year to buy my first Osborne, I would have saved several hundred dollars. The printer we bought had dropped in price by almost \$300 six months after we got it. Do we regret it? No. I've gotten my money's worth out of the machines. I recovered the difference on the printer when I started selling magazine articles. If I'd waited, I probably wouldn't have sold some of the articles I did. So, if you have a real use for a computer buy it NOW.

New or used? This is a tough decision and one that has many factors. If you purchase a new one, it may come with a nice warranty package. Although this will help should your computer suffer a major breakdown, you can count on being without it for a few days. As long as you don't depend on it for business purposes, you can probably suffer through. (Just hope your teenager doesn't have an important science report due.)

Because of the nature of electronics, if a computer component is going to fail it will usually do it right away. Sometime within the first two weeks. This means that the circuitry isn't likely to fail after that unless it gets hit with a voltage spike from an unprotected line. (If your computer is important to you a surge protector is a good investment.) The mechanical parts (disk drives) may go at anytime, but the circuitry actually gets stronger with age. Frequently, new computers haven't been set-up and running. This means that if they have faulty circuitry, they'll probably fail immediately. Don't be too averse to buying a floor demonstration model. It may be the best deal in the room.

Because of dealers' reluctance to properly "burn in" the

machines, a used computer may be the best buy. If you can find an honest seller. Before buying used equipment be sure that it works. USE IT. Spend some time at the keyboard seeing how it works. Ask the seller why he wants to be rid of it. There could be any number of reasons besides the computer being defective. But you should find out. If you are buying a computer/software package deal make sure that the computer owner has the right to sell his license in the software. Unless you ascribe to piracy, you won't want to be in possession of illegal disks. Please, check to be sure you can get the software relicensed. If not, you'll need to buy the programs and so should not pay for them in the price of the computer.

One good recommendation I heard recently was to remember to include the price of disks, paper, ribbons, software instruction courses, and other incidentals in your projected expenditure. Yes, Marie, at \$25 a box or better disks can quickly eat up the cash. Cassettes aren't much cheaper.

As you can see, there are a number of things to take into consideration. Looking in the Computer Shopper for used equipment is a good place to start. You can get some idea of what sellers really think their computers are worth. Another interesting thing to check is how many different personal advertisements you see for each computer brand. There may be some correlation between the number of a certain computer being offered and their owners dissatisfaction with them.

Whether you are choosing your first or second or 25th computer, you need to be a careful shopper. Or are you independently wealthy? Well if you are, you won't stay that way if you don't mind your pennies. For the rest of us, choosing a computer is a very personal thing. The best advice I've heard is "Don't buy anything 'till you've tried it." Keep this in mind when you're tempted to just throw in the towel and buy the same computer they use at the youngsters school.

And one last bit of advice, if you've got kids who are old enough to use it, let them help choose it. I still recall the frustrated salesman at the annual computer show. One of the browsers stopped by and said, "It must be a real pain having all these kids hanging around bothering you?" The salesman replied without batting an eye, "Oh, it's not the kids I mind so much. At least they ask intelligent questions." ●

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TRS-80

Mass Data Storage For The Model 100

by Stan Veit

The Radio Shack TRS-80 Model 100 is the most popular of the Notebook (or Lap) Computers on the market. Its built-in programs and modem works like a charm and very few people who use it ever want to let go of it.

It has one defect and that is the cassette type interface. The first problem is that it is a cassette system and the second is that in order to make it work you need to use a cassette recorder that is half the size of the computer.

When I bought my PC-2, which was my first portable computer, I bought a RS Miniset Recorder and it was fine, it was small and loaded every time. When I tried to use the same recorder on the Model 100, it was a disaster. The recorder that works best with the Model 100 is the Radio Shack CCR81. Which as far as I am concerned is too big!

My way of dealing with this was to not use the cassette interface at all. I just held my file in RAM until I could dump it into my TRS-80 Model 4 and then to disk! This is really not a good answer to the problem of mass data storage but I was waiting for a product that Radio Shack had assured me would be out sooner or later, a disk interface.

I was one of the first magazine writers to see the Model 100 before Tandy released it for sale and I fell in love with the idea of a portable with real keys and real computing power. The people at Radio Shack had told me that

there would be a video/disk interface that would convert my Model 100 into a desk top computer when I wanted to use it at my desk. That was the final sales argument I needed. I bought one of the first Model 100's to arrive in New York. Since then I have bought all the peripherals that Radio Shack offered for the Model 100, and it has become my "Good Buddy" going everywhere with me. To the computer shows, press conferences, meetings, interviews, whatever. It is my battery-eating friend.

At the last West Coast Computer Faire, I wandered over to the Radio Shack booth and there it was, a small box (12" by 12" by 5") connected to a

Model 100 and a Video Monitor. It had come, the long awaited Disk/Video Interface. Quick as a wink, I whipped out my credit card and bought the interface right on the spot. When I got home to Florida, it was there waiting for me.

Strangely enough, the next day I got another package that I had been waiting for, the PMD-100 Portable Micro Drive from Holmes Engineering Inc. Now I had two mass data storage devices for the Model 100. Aha! I thought, I will write a review comparing them. However, after learning to use both of them I realized that these are not really com-



Model 100 Data Storage Devices.

Continued on page 38

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Mass Data Storage

Continued from page 37

peting units. Comparing them would be like comparing pistols and shotguns. They both have a different use. I will therefore report on the pros and cons of each one and let

you decide which one fits your needs.

The Radio Shack Disk/Video Interface

The Disk/Video Interface is mounted in a metal box about 12" square and 5" high. It mounts a half height disk drive, with provisions for a se-

cond drive. Only the drives and indicator lights are seen on the front panel. On the rear panel there are connections for either a video monitor, or connection to a home TV through a built-in RF modulator and a TV switch supplied with the unit. The RF output can be set either for Chan 3 or 4 by a switch on the unit. There is also a power On/Off switch and fuse holder.

With great eagerness I made my equipment ready for the installation as described in Chapter 3 of the manual. First I removed the compartment cover on the bottom of the Model 100 and read the instructions. They tell me to use the "UPPER" IC Socket in the compartment. Which is "upper" in a flat computer? I looked at the sole illustration and tried to figure it out. The picture was not much help. It doesn't clearly show if there is

a twist in the cable, or not. In addition the connector at the Interface end was not keyed, although the manual said it should be! It also said the pin numbers for pins 1 to 40 were marked in white on the pc board so the socket end would be inserted with pin #1 in the correct position. Trouble was that the socket is soldered over the numbers so you can't read them.

After using a bright lamp and magnifying glass plus luck, I installed the cable in what proved to be the correct position. Even though RS gives you a Zero Insertion Force Adapter for the socket, sooner or later you are going to bend the pins on your cable. I hate DIP socket cables because of this problem. There is a way around it however, just buy a 40-pin socket, plug your cable into that socket and plug the socket pins into the adapter.

That way when your pins get bent, you just throw away the intermediate socket and install another one!

Having suffered through installation, I was ready to start with my Disk/Video Interface try out. Next thing I noticed was that the cable was too short to allow me to put the box in a corner of my desk and keep the Model 100 in front of me. Ft. Worth struck again!

I turned to the System Start-up section of the manual and followed instructions. All went well this time. The system came up and I loaded Disk-BASIC into the Portable Computer. Then I changed from the LCD Display to the video screen. Again all went well as I went from a 40-character screen to an 80-character by using the WIDTH command.

Continued on page 42

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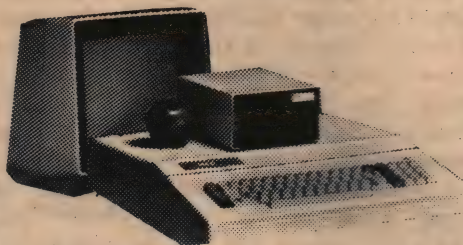
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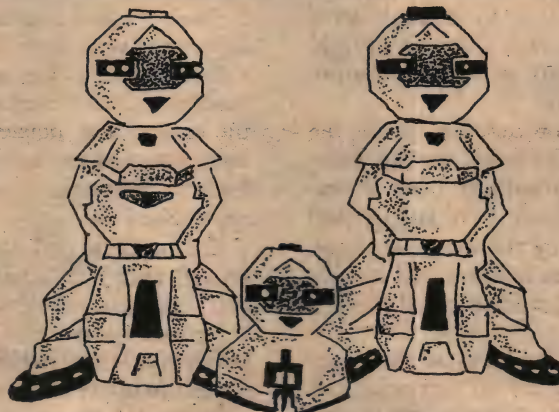
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The Clear-Cut Winner

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By Terry Kepner

Finally, someone has designed an MS DOS home computer that looks as if it belongs in a home. The new Sanyo MBC-550 (and MBC-555), with its stylish, thin, sleek, polished chrome appearance blends in perfectly with the average home component stereo system.

If you happen to like the new component TV systems, with their quality TV monitors, stereo video receivers, separate speakers and compatibility with normal stereo components, you'll love the new Sanyo computer and the way it disappears among the other components. When you want to use it, just turn it on (make sure it's plugged into the monitor), pull the separate keyboard out of hiding and begin working.

And if you don't want to "hide" the unit among your stereo components, its attractive design complements most office or modern room decors.

If appearances were the only criteria, then the Sanyo computer would rate a good hard look from an MS DOS buyer. But there's more to it than that. Not only is it stylish, it comes with bundled software that easily doubles the value of the computer, without doubling the cost. In fact, the Sanyo is, without a doubt, the least expensive MS DOS computer on the market, coming in at \$999 (that's without the monitor, and you can't just use a color TV).

What you get for your \$999 is a 128Kb MS DOS computer with one double-density, single-sided disk drive, MS DOS 1.0, and WordStar, EasyWriter I and CalcStar as the bundled software.

If you want a dual-drive unit, you can order the MBC-555 (\$1399), or just order the second drive (\$399) for your MBX-550 and have it installed by a dealer. You can also do it yourself (instructions are provided in the manual).

In either case, the second drive includes more bundled software, with your choice of SpellStar, Mailmerge (for WordStar) and InfoStar, or an IUS software package consisting of EasyWriter II, EasyPlanner, EasyCalc and EasySpeller.

A Popular Chip

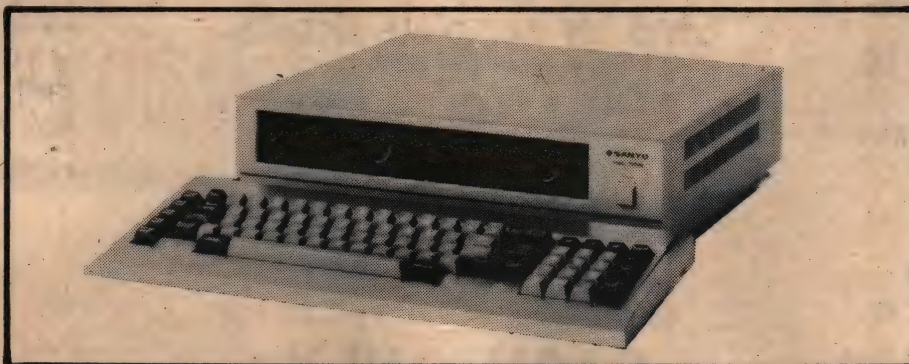
The Sanyo MBC-550 is based on the popular 8088 CPU and runs at 3.6 MHz. It comes standard with 128Kb of RAM (upgradeable to 256Kb) and 48Kb of video RAM (16Kb is in user RAM). An 8Kb ROM contains the initial power-up logic (IPL) and color

graphics logic.

If you're using a color monitor, the display parameters are as follows: eight colors (including black and white), 640x200 eight-color resolution, a 6x7 character font in an 8x8 dot box with 80 characters per line and 25 lines per page. The monochrome parameters are similar, except that you don't have colors available.

The floppy disk drives, which consist of 160Kb double-density units, are a disappointment. The limited disk space is a problem when using the bundled software; since you must put MailMerge on the same disk as WordStar, you rapidly begin to run out of room. Fortunately, though, double-sided (320Kb) drives will be available around June, as will hard disks (\$1995) and DOS 2.0.

For the adventurous, TEAC 55B drives (\$169 in quantities of two) are compatible and fit in the MBC-550 cabinet. It's possible that these will be the drives used by Sanyo when they offer



upgrades (since the current drives are also TEAC). If you decide to install your own double-sided drives, a compatible BIOS is available from Michtron in Michigan at \$49.95. The drives are available from ANI (17752 Sky Part Circle, Irvine, CA 92714).

The standard drives can't read IBM double-sided disks, but single-sided disks can be read.

The review unit is a single-drive 128Kb machine with a standard black-and-white monitor and a second uninstalled disk drive.

The installation instructions for the second drive, included in the main manual, were insufficient for a novice, but the second drive is supposed to be installed by the dealer anyway. The manual clearly states that inexperienced users shouldn't install the second drive.

The primary problem is the omission of instructions on removing the large plastic case that's in the second drive's position on a single-drive computer. It must be removed for the second drive to fit. With these instructions in hand, the second drive installation is fairly simple.

Helpful Hardware Hints

Calling the Sanyo area representative for drive installation instructions elicited these additional helpful hardware hints on getting the most from

the machine. First, remove the cover and disconnect the wires leading to the internal speaker, cover them with tape and tuck them out of the way. Second, if you're using a black-and-white monitor, find the DIP switch bank on the back of the computer and set #1 to On and the rest to Off.

The first hint eliminates the annoying beep used to denote syntax errors and the second configures the MBC-550 from color to monochrome operation, doubling the display resolution.

The keyboard is attractive, well-designed and well-made, with 81 keys, including function keys and a numeric keypad, and a coiled keyboard connector cable that gives you positional flexibility.

The keys don't click as you type, and the shift lock and graph lock keys have LED indicators so you know when they've been activated. The keyboard can generate 223 different characters, including the standard ASCII characters, by using combina-

tions of the graph, shift and control keys. The computer can actually display 255 characters, with the extra 32 characters occupying the first 32 ASCII positions, which the keyboard uses to generate control codes instead of character codes. (To print these characters you must use CHR\$(x), or its equivalent). See Fig. 1 for the entire Sanyo character set.

There are five function keys on the keyboard, with both shifted and unshifted values, for a total of ten functions. This can be a problem since the insert and delete functions are both assigned to the same key. This leads to problems if you're a sloppy typist like I am.

The numeric pad uses the standard layout, with both 0 and 00 keys like a good calculator, and also doubles as the cursor-control pad: left, right, up, down and home (which puts the cursor in the upper left corner of display).

Physically, the keys are sculptured with a gradual curve to assist in typing. The whole keyboard gently slopes towards you.

The keyboard is an improvement over the IBM keyboard, but then again almost anything would be an improvement over the IBM. Fig. 2 shows the translation table for the two computer keyboards.

In operation, the computer performs well, but it does have one idio-

syncrasy: the disk drive light is always on. On most computers, the LED disk drive light is used to signify that the drive is currently reading or writing to the disk; however, on the Sanyo, the light is used to tell you which disk drive is logged in as the current MS DOS drive.

On a two-drive system this might be useful, but on a single-drive system it's a waste. It can also be confusing. Since you never know when the computer has finished writing to a disk, you don't know when it's safe to remove it from the disk drive.

The typing action is fast and clean, but if you make a mistake, the computer lets you know about it with a loud, obnoxious, low-pitched "burp"—almost like a Bronx cheer. This is annoying and elicited numerous complaints from my wife when I stayed up late using the machine.

Suitable Software

As I mentioned earlier, the single-drive computer is sold with EasyWriter I (a word processor for beginners and intermediate users), WordStar (the number 1 selling word processor on the market) and CalcStar (a spreadsheet manipulation program).

These three packages cover most of the uses MS DOS computers are called upon to service.

Adding the second drive, with SpellStar (spelling checker for WordStar), MailMerge (for mass-mailing wordstar documents) and InfoStar (a database manager), completes the package.

All the "-Star" packages are IBM PC compatible, with only minor alterations in operation. WordStar, for example, is slightly off-color when used on a standard IBM PC with color graphics board and monitor.

If, however, you decide to use the IUS software, you can use them only with the Sanyo MBC-550 and -555 computers, since IUS has decided to customize the bundled software to work only on those computers.

MS DOS and GWBasic programs will work on the Sanyo MBC-550, with the exception of programs that make specific calls to IBM hardware or use nontransportable color and graphics commands. This is the same caveat emptor that all MS DOS-compatible computer owners must skirt. Any program that requires specific hardware designs found only in the IBM won't work in the PC-compatible computer. Programs that use only the standard MS DOS machine code call locations should work just fine in the MS DOS environment.

The Basic Decision

The Basic isn't as easy a decision. It isn't a Microsoft Basic. To take full advantage of the machine's capabilities, Sanyo decided to write its own Basic. This Basic is definitely superior to Microsoft's if only for one reason: it's not

limited to only 64Kb of RAM.

Microsoft Basic is artificially limited to 64Kb; no matter how much RAM your computer has, 128Kb or one megabyte, Microsoft Basic uses only 64Kb of the RAM. The rest is ignored. This severely limits programs by cutting them off from the RAM available in your computer.

Sanyo Basic, though, provides complete access to all the RAM installed in your computer, giving you the option of using Basic programs with large databases or arrays in memory.

Several immediate possibilities are in-memory mailing lists or specialized data files. The disadvantage is that not all Basic programs for IBM Basic will work in Sanyo Basic.

Sanyo Basic introduces one graphics command that I wish Microsoft had for its Basic: Symbol. This command lets you print a character or set of characters on the screen in one of seven sizes of height and width and rotate it in four positions (90-degree increments)! You can print it tall and skinny, short and fat, upside down, sideways and in many other ways.

Another improvement over the IBM is that you can easily halt a program listing by pressing the space bar. Pressing any other key continues the listing.

Finally, Sanyo Basic has 146 different error messages, as opposed to IBM's 53. Fig. 4 lists the new messages not found on the IBM and also lists IBM messages not found on the Sanyo.

When MS DOS 2.0 is released, some of the error messages left out of the Sanyo list may be included, which will increase the Sanyo's total count.

Better than the Average Manual

The system manual supplied with the Sanyo computer is much better than most; it describes all subjects completely and accurately, with examples and clear explanations.

The manual combines the instructions for Basic, MS DOS and the computer itself. The set-up section includes check-off boxes and diagrams so you won't lose your place while hooking up your printer or video. Even though these are simple procedures, the manual tries to make them foolproof.

In evaluating this computer, I talked to a nontechnical Sanyo user. He had never used a computer before and found the manual to be sufficient and easy to understand. The commands are explained nearly to the point of being a tutorial.

The only complaint is that the manual fails to include instructions on how to work around the limited-capacity disk drives. He spent a lot of time figuring out that in order to use WordStar and MailMerge, he had to put them both on the same disk; this wasn't mentioned in the documentation.

The manuals were printed by a daisy-wheel printer (not typeset) with some areas shaded later as needed. It was written in-house by Sanyo staff and is an improvement over the manuals distributed by Microsoft. Documentation includes a complete and clearly written glossary and index.

The book, to our surprise, includes a section on technical information, describing the memory map, ROM map, interrupt vectors, I/O controller, some of the interrupt routines, I/O map and other programming information—a nice change from the "top secret" mentality that many companies seem to adopt.

The section on Basic is organized alphabetically by type (graphics commands all together, math commands all together and so on), rather than just alphabetically, but the index helps overcome that referencing limitation.

At the back of the manual is a section on installing peripherals like the second disk drive, RS-232C board and

memory expansion. That's what I call helping the home user!

The other manuals included with the computer cover the bundled software, with one manual for EasyWriter I, WordStar and CalcStar, and the other manual for the software bundled with the second disk drive.

A Hot Item

The Sanyo computer is a terrific machine for its price and capabilities. The inherent limitations of single-sided drives will be corrected by the soon-to-be-available double-sided and hard disk drives.

The software delivered with the computer is a good way to computer-

ize an office, step-by-step, including both a simple word processor and the most popular word processor, and a spreadsheet program.

By the time most users need to expand the system, the appropriate hardware and software will be available. The only disadvantage is the incompatibility of Microsoft MS DOS Basic and Sanyo MS DOS Basic.

Sanyo sells the MBC-550 primarily as a word processing/information management system. Considering the bundled software and low price, the machine fits the bill and is, indeed, a hot item. ■

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Mass Data Storage Continued from page 38

The manual warns that you should turn off the power to the system before you disconnect the D/V. It also tells you to press F8 on the Model 100 before you power down. You had better read this manual before using the system. There are a lot of little tips you must know. The fact that you are a TRSDOS wizz is not enough. This is not TRSDOS, you must learn a new, but simple system.

I learned to make a disk backup and to use Disk-BASIC. I also learned to use

my floppy disk in TEXT and this to me is worth the price of the system. I do need a format program that runs on the D/V but that will come I am sure.

The D/V is just an opening into a vastly increased capability for the Model 100. Frankly, I think it is overpriced at \$800 but RS said that with all the intelligence inside it had to cost that much. Well once the hurt of the price is over, I really like the unit. I asked if RS can do anything about the too short cable and they confessed that this was a requirement of the FCC. I will have to make my own cable, if some company does not read this and smell a product need. If they do, send me one first thing!

The Model 100 D/V is another chance for software developers to open a market. I don't know how many people will spend \$800 bucks for one, but those that do, like me will need software that works with the Model 100 system.

I will write some of my own, but my business is writing ar-

ticles, not programs.

On a scale from 1 to 10, I give it a 7. If it cost \$200 less it would be a 9.

The Holmes PMD-100 Portable Micro Drive

This unit not only provides reliable data storage for the Model 100, but it also is as portable as the computer itself. In fact it can live in the same carrying case as the computer. The unit is powered by a large rechargeable battery that will power both the computer and the drive unit for hours of operation. You can also plug in the AC Adapter/Battery Charger and operate both the computer and the drive from one power source. This saves the batteries in the Model 100 which is a fine thing given its appetite for batteries.

This unit does not use diskettes, instead it records the data on a thin wafer of magnetic tape in digital form. This tape is packed in a thin cassette called a "wafer" in a continuous loop. The tape is wound around an open faced rotating spool. It is pulled from the

center of the spool passed over the read/write head and then wound back on the outside of the spool in one continuous operation. This makes the PMD tape drive very simple because it only moves in the forward direction and does not re-wind the tape. It also makes the operation much slower than a disk because it is always moving the entire length of the tape to find the data.

The connecting cable between the PMD and the Model 100 has a telephone-type jack on one end and a RS-232C DB25 on the other. It is very easy to connect the PMD and the instructions are easy to read and accurate.

The operating system resides within the PMD and must be loaded into the Model 100. This is done by downloading through the TELCOM program in the Model 100. You just follow the steps in the manual and it will work without any problem. Once you have WAFER.CO on the Model 100 menu, you just connect the PMD and use the menu to bring up WAFER.CO. The PMD Operating System is in control and you can SAVE, CATALOG TAPE, FORMAT, QUICK SAVE, LOAD, EXIT, or DELETE last file. Since this is a serial device, on-

ly the last file is accessible to you for deletion. The system works but it is slow compared to a disk system, but much better than cassette audio storage. In addition it only costs \$349.95 instead of \$800. If you are not in a hurry and don't need the video, the PMD-100 may be exactly the system you need.

After we had reviewed the PMD-100, we received notice from Holmes Engineering that they had a new model of the Wafer Drive. It is called THE BULLET and it replaces the PMD-100. According to Holmes Engineering, the Bullet addresses many of the objections to the PMD-100. It is much faster, it saves or loads in 1/2 the time of the PMD-100 and it uses the function keys on the Model 100 to operate the system. It also has a 4K of ROM based operation system for the Scribe Word Processor. The new system is priced at \$369.95. The Data Wafers come in 10' to 50' lengths holding from 12K to 64K of data.

Having used the PMD-100 and read about the improvements in The Bullet, we must say that if we had not invested \$800 in the Disk/Video Interface we would buy The Bullet without further thought. We wish we could afford both of them! ●

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Interactive. MTBASIC doesn't use a tedious EDIT, COMPILE, LINK, LOAD, EXECUTE cycle. MTBASIC operates just like an interpreter; statements are entered with line numbers and checked syntactically as they are entered. When RUN is typed, MTBASIC quickly compiles the program and executes it. As with an interpreter, programs can be modified and retested in seconds. Compiled versions can be stored on disk for stand alone execution.

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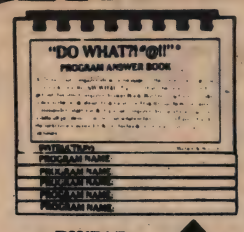
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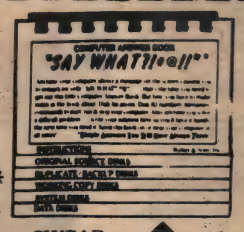
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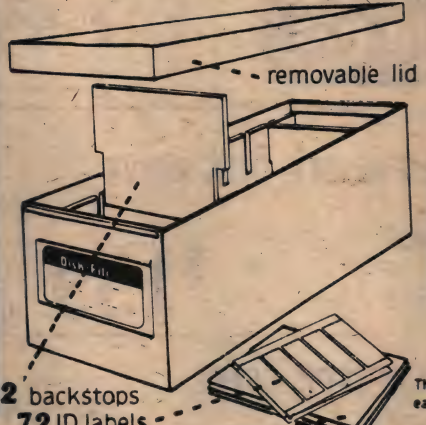
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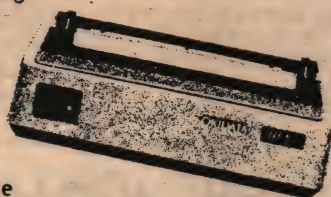
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Continued on page 50

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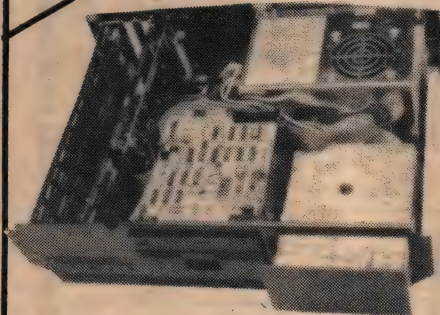
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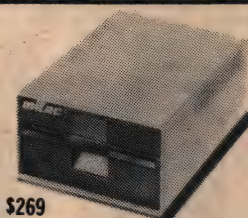
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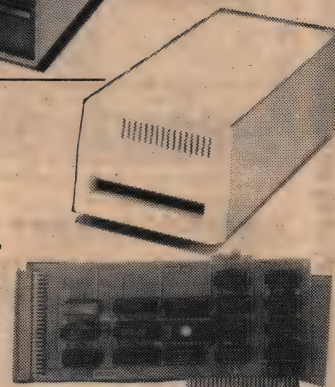
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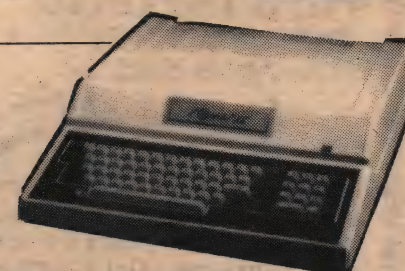


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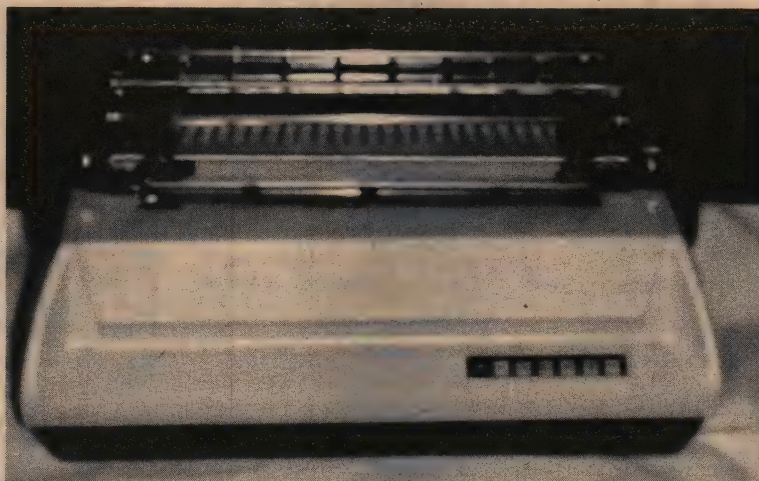
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HI DESERT APPLE COMPUTER CLUB, PO BOX 2702, LANCASTER, CA 93539
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IBM PC USERS GROUP, c/o M. BRIOSKI, 1880 CALIFORNIA - 12, SAN FRANCISCO, CA 94109
INTECOLOR-COMPCOLOR USERS GROUP, 5250 VAN NUYS BLVD., VAN NUYS, CA 91401
INTERNATIONAL APPLE CORE, 908 GEORGE ST., SANTA CLARA, CA 95050
INTERNATIONAL HOME COMPUTER USERS ASSOCIATION, PO BOX 371, RANCHO SANTA FE, CA 92067
INTERNATIONAL NORTH STAR USERS ASSOCIATION, PO BOX 1318, ANTIOCH, CA 94509
INTERNATIONAL SOCIETY OF PERSONAL COMPUTERISTS, 4554 CRISTY WAY, CASTRO VALLEY, CA 94546
JPL APPLE COMPUTER CLUB, 4800 OAK GROVE DRIVE, PASADENA, CA 91103
KAYPRO USERS GROUP, 3134 N. PALM SHIELDS, FRESNO, CA 93704
KRANISG CORP. USERS GROUP, c/o CRAIG SHELDON, BOX 217, STRATHMORE, CA 93267
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LOGIGIC CLUB, 550 MARIGOLD DR., FAIRFIELD, CA 94533
LOS ANGELES COLOR COMPUTER USERS GROUP, c/o CRAIG R. HANNA, 10144 DAINES DR., TEMPLE CITY, CA 91780
LOS ANGELES CROMEMCO, 4747 SUNSET BLVD., LOS ANGELES, CA 90027
MADISONIAN NATIONAL COMPUTER CLUB, 12702 EMELITA ST., NORTH HOLLYWOOD, CA 91607
MARIN COUNTY TRS-80 USERS GROUP, c/o LINCOLN DR., SAUSALITO, CA 94965
MICRO-MATE HACKERS NEWSLETTERS, 12155 EDGECLIFF PL., LOS ALTOS, CA 94022
MIDPENINSULA, 3939 FABIAN WAY, PALO ALTO, CA 94303
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OASIS USERS GROUP, PO BOX 2400, SANTA BARBARA, CA 93120
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ORANGE CO TRS-80, MILE SQUARE PK., FTN VALLEY, CA 92708
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PROF. SOFTWARE PROG. ASSOC., PO BOX 1389, CAMPBELL, CA 95008
PROGRAMMER'S CLUB/WGFC, 10 FIELDBROOK PLACE, MORAGA, CA 94556
PROTEUS PROCESSOR TECHNOLOGY USERS, 1690 WOODSIDE RD., SUITE 219, REDWOOD, CA 94061
SACRAMENTO IBM PERSONAL COMPUTER USERS GROUP, 6941 LE HARVE WAY, CITRUS HTGS., CA 95610
SACRAMENTO U COMP USERS, 59TH ST., SACRAMENTO, CA 95819
SAN DIEGO COMPUTER SOCIETY, 6401 LYNDA-VISTA RD., SAN DIEGO, CA 92111
SAN FERNANDO VALLEY 6502 USERS GROUP, c/o LARRY GOGA, 3816 ALBRIGHT AVE., LOS ANGELES, CA 90066
SAN FERNANDO VALLEY COMPUTER USERS GROUP, c/o H.W. COMPUTER, 19511 BUSINESS CENTER DR., NORTHRIDGE, CA 91324
SAN FRANCISCO TRS-80 USERS GROUP, 2001 WILLOW ST., SAN BRUNO, CA 94066
SAN GABRIEL VALLEY TRS-80 USER GROUP, c/o DAN DRESSELHAUS, 750 E. 5TH ST., -75, AZUSA, CA 91702
SANTO-PC-HACKERNEWSLETTER (INTERNATIONAL), 12155 EDGECLIFF PL., LOS ALTOS HILLS, CA 94022
S.B.A.C.E., SANTA BARBARA A.C.E., 365 HILLSBORO WAY, GOLETA, CA 93177
SAN JOAQUIN DBASE II USERS GROUP, PO BOX 217, STRATHMORE, CA 93267
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SILICON VALLEY COMPUTER SOCIETY, PO BOX 60506, SUNNYVALE, CA 94088
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S.M.U.G., SACRAMENTO MICROCOMPUTER USER GROUP, PO BOX 60116, SUNNYVALE, CA 94088
SMARTUG, SANTA MONICA AREA TRS-80 USERS GROUP, 1433 11TH ST., #3, SANTA MONICA, CA 90401
SOCIETY OF COMPUTER USERS, c/o MR. HOLLAND, PO BOX 555, INVERNESS, CA 94937
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SOUTH BAY TRS-80 USERS GROUP, PO BOX 60116, SUNNYVALE, CA 94088
SOUTH BAY 99ERS, 517 EAST BAYSHORE, REDWOOD CITY, CA 94063
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SUPER BRAIN USERS GROUP, PO BOX 3121, BEVERLY HILLS, CA 90212 (INTERTEC COMPUTER USERS)
TIS 1000 GROUP & VIC-20 GROUP, PO BOX 5703, STOCKTON, CA 95204
TRI-VALLEY 99ERS CLUB, 306 FLITNER CIRCLE, THOUSAND OAKS, CA 91360
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TRS-80 MODEL 4 USERS GROUP, 14472 E. AMHERST, MOORPARK, CA 93021
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TRS-80 USERS, 604 7TH ST., SANTA ROSA, CA 95404
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UCSD - SYSTEM USERS SOCIETY, PO BOX 1148, LAJOLLA, CA 92038
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Z-WEST, PO BOX 2411, VISTA, CA 92083
ZX81/TS1000 USERS, PO BOX 2411, VISTA, CA 92083
64K COCO NUTZ, 569 PARSONS DRIVE, REDDING, CA 96002

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COLORADO SPRINGS OSBORNE GROUP, c/o JOHN WISMAN, PRES., 6536 LANGE DR., COLORADO SPRINGS, CO 80918
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DENVER OSBORNE USERS GROUP, c/o STEVEN BENTLEY, PO BOX 521, KITTREGE, CO 80457
MICRO COMPUTER USERS GROUP, PO BOX 2382, GRAND JUNCTION, CO 81502
PC USERS GROUP OF COLORADO, PO BOX 944, BOULDER, CO 80306, 303-443-5528, evenings.
SOUTHERN COLORADO APPLE USERS, 1635 S. PRAIRIE AVE., PUEBLO, CO 81005
SOUTHERN COLORADO COMPUTER CLUB, 1635 S. PRAIRIE AVE., PUEBLO, CO 81005

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APPLELIST USERS GROUP, PO BOX 8235, NEW HAVEN, CT 06350
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COMMODORE USERS GROUP OF STRATFORD, PO BOX 1213, STRATFORD, CT 06497
CONNECTICUT COMPUTER SOCIETY, 180 BLOOMFIELD AVE., HARTFORD, CT 06105
CONNECTICUT COMPUTER SOCIETY, 1199 FARMINGTON AVE., W. HARTFORD, CT 06107
CONNECTICUT CPM USERS GROUP, c/o MALCOLM ROTH, 62 BURNWOOD DR., BLOOMFIELD, CT 06002, (203)243-3063
CONNECTICUT MICROISTS, 3 WENDY LN., WESTPORT, CT 06880, DATALINE 203-227-4946
CONNHUG, 395 WEST MAIN ST., AVON, CT 06001
D.P. DIRECTIONS, PO BOX 562, BLOOMFIELD, CT 06002
DOCTOR COMPUTER CLUB, 42 E. HIGH ST., E. HAMPTON, CT 06424
FAIRFIELD COUNTY TRS-80 USERS GROUP, c/o ALAN ABRAHAMSON, 10 RICHLEE RD., NORWALK, CT 06851
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PROCOMP, 844 VERNON ST., MANCHESTER, CT 06090
THE UCONN PC CLUB, PO BOX 542, STORRS, CT 06268

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THE BRANDYWINE USERS GROUP (BUG), PO BOX 10943, WILMINGTON, DE 19850
TI DELAWARE VALLEY USERS GROUP, c/o JACK SHATTUCK, 2 COLONY BLVD., APT. 101, WILMINGTON, DE 19802

DISTRICT OF COLUMBIA

CPM USERS GROUP OF WASHINGTON DC, c/o WINSTON RILEY III, 7315 WISCONSIN AVE., WASHINGTON, DC 20814

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COLOR COMPUTER CLUB OF SARASOTA, 4047 BEE RIDGE RD., SARASOTA, FL 33582. ATT: ERNIE BONTRAGER
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FLORIDA WEST COAST OSBORNE CLUB, 1210 CASEY KEY ROAD, NOKOMIS, FL 33555
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JACKSONVILLE HEATH USERS GROUP, 8262 ARLINGTON EXPRESSWAY, JACKSONVILLE, FL 32211
JACKSONVILLE OSBORNE USERS GROUP, 12113 BLACKFOOT CT., JACKSONVILLE, FL 32223
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MAMMASOTA IBM-PC USER GROUP, 1102 MALLORIA DR., BRADENTON, FL 33529, 813-792-5400
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MSIG-OSI, (MIAMI SPECIAL INTEREST GROUP:OSI), 656 NE 164 ST., N. MIAMI BEACH, FL 33162
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NATIONAL PUBLIC DOMAIN USERS GROUP, FOR OSBORNE I COMPUTERS, PO BOX 1442, ORANGE PARK, FL 32067-1447
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NORTHERN FLORIDA FRANKLIN COMPUTER CLUB, 1627 LEON RD., JACKSONVILLE, FL 32216
OTOG USERS GROUP FOR VIC 20 & COMMODORE 64, 321 ALMA ST., KISSIMMEE, FL 32741
PC USERS GROUP OF FLORIDA, PO BOX 9266, FT. LAUDERDALE, FL 33310
PINELLAS IBM-PC USERS GROUP, 3401 GANDY BLVD. LOT #628, PINELLAS PARK, FL 33566, (813) 576-2608
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SUNCOAST APPLE USERS GROUP, PO BOX 7488, CLEARWATER, FL 33158, 1ST TUESDAY OF EACH MONTH, CLEARWATER CENTRAL CATHOLIC HIGH SCHOOL, 7:00 PM. FOR MORE INFORMATION CALL (813)531-7190
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SPACE COAST NEC USERS GROUP, c/o FRANK SCHNEIDER, 70 CEDAR AVE., UNIT #1, COCOA, FL 32931
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THE SOUTH FLORIDA ZX USERS GROUP, PO BOX 057381, WEST PALM BEACH, FL 33405
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VIC-20 COMPUTER CLOB, c/o RAY THIGPEN, 4071 EDGEWATER DR., ORLANDO, FL 32804
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ATLANTA CONTACT ATARI GROUP, c/o N. CRANE, 779 ROLLINGWOOD DRIVE, STONE MT., GA 30087
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HAWAII PORTABLE COMPUTER USERS GROUP, c/o COMPUTER MARKET, HECTOR ROBERTSON, PRES., 578 ALA MOANA BLVD., HONOLULU, HI 96813

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COUNTY OF LAKE APPLE CLUB, 470 NORTH LAKE STREET, MUNDLEIN, IL
CRABAPPLES, RR #8, CARBONDALE, IL 62901
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JOLIET APPLE USERS GROUP, 101 SPRINGFIELD AVE., JOLIET, IL
MAX - " USERS GROUP, 5201 MILWAUKEE AVE., 2ND FLOOR, CHICAGO, IL
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MTUPG PASCAL/MT USERS GROUP, PO BOX 192, WESTMONT, IL 60559
NORTHERN ILLINOIS APPLE USERS GROUP, 1271 WEST DUNDEE RD., BUFFALO, GROVE, IL 60090
NORTHERN ILLINOIS COLOR COMPUTER CLUB, 1217 KINGS COURT #12, WEST CHICAGO, IL 60185
NORTHERN ILLINOIS COMPUTER OWNERS, 26 W. 484 BUTTERSFIELD, WHEATON, IL 60187
NORTHERN ILLINOIS IBM-PC USERS GROUP, UNION OIL BUILDING, SCHAUMBURG, IL
ONE ON ONE, 948 PROSPECT AVE., ELMHURST, IL 60126
PEORIA ATARI COMPUTER ENTHUSIASTS, PO BOX 32, WASHINGTON, IL 61571
PUBLIC ACCESS MICROCOMPUTER USERS GROUP, ARLINGTON HEIGHTS MEMORIAL LIBRARY, 500 NORTH DUNTON, ARLINGTON HTGS., IL 60004
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SINCLAIR END USERS' GROUP, c/o DIANA WRIGHT, 2170 OAKBROOK CIRCLE, PALATINE, IL 60067
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TANDY BUSINESS USERS GROUP, PO BOX 631, LAKE FOREST, IL 60045
UNION PIRATES, BOX 566, GRANVILLE, IL 61326
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WESTERN ILLINOI PET USERS GROUP, RTE. 5, BOX 75 QUINCY, IL 62310
WILL COUNTY COMPUTER USERS, LOCKPORT LIBRARY, 8TH & HAMILTON, LOCKPORT, IL
WOODFIELD AREA COMPUTERIST ORG., PO BOX 94781, SCHAUMBURG, IL 60194
Z-80 STARTER KIT USER'S GROUP, 6000 PUFFER RD., DOWNERS GROVE, IL 60516

Users Groups

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COMPUTERS FOR PROFIT CLUB, PO BOX 13075, FORT WAYNE, IN 46867
CP/MORROW GROUP OF INDIANA, 57 VINE ST., HUNTINGTON, IN 46750
EVANSVILLE COMPUTER CLUB, PO BOX 3284, EVANSVILLE, IN 47732
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INDIANA HEATH USERS GROUP, 5113 DICKSON RD., INDIANAPOLIS, IN 46226
INDIANAPOLIS SMALL SYSTEMS GROUP, PO BOX 40733, INDIANAPOLIS, IN 46240
KOKOMO APPLE USERS GROUP, 2315 W. JEFFERSON ST., KOKOMO, IN 46901
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SOUTHERN INDIANA COMPUTER CLUB, RT. 1, BOX 459, MITCHELL, IN 47446
THE CENTER COMPUTER ORGANIZATION, PO BOX 6031, SOUTH BEND, IN 46660-6031

IOWA

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CEDAR VALLEY 99ER USERS GROUP 2705 16TH AVENUE, MARION, IA 52303
CENTRAL IOWA 99/4A USERS GROUP, 3013 EAST 32ND STREET, DES MOINES, IA 50317
CENTRAL IOWA 99/4A USERS GROUP, c/o ROBERT UTTER, 3013 E. 32ND ST., DES MOINES, IA 50317
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EASTERN COMP CLUB, BOX 164, HIAWATHA, IA 52233
HAKATARI, 2564 22ND AVE., MARION, IA 53202, ATTN: JOHN WIESE
HAWKEYE - PC, IBM PC USERS GROUP, 385 COLLINS RD. N.E. SUITE 201, CEDAR RAPIDS, IA 52404
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IOWA USER GROUP, 844 10 ST. N.E., MASON CITY, IA 50401
MIDWEST ATARI GROUP, IOWA CHAPTER (MAGIC), 1125 3RD ST., NEVADA, IA 50201
QUAD CITY COMPUTER CLUB, 215 MAIN ST., #515, DAVENPORT, IA 52801
THE GREEN APPLES, BOX 622, CEDAR FALLS, IA 50613

KANSAS

APPLE BITS, 6140 GLENWOOD, MISSION, KS 66202
COMMODORE USERS GROUP OF WICHITA, ROUTE 1, BOX 115, VIOLA, KS 67149
KANSAS CITY METRO USER'S GROUP, 7010 CAENEN AVENUE, SHAWNEE, KS 66216
LAWRENCE ATARI COMPUTER CLUB (LACC), PO BOX 1415, LAWRENCE, KS 66044
THE PLANE APPLE CLUB, PO BOX 47396, WICHITA, KS 67201
WALTER LOUNSBURY, 739 LITCHFIELD, WICHITA, KS 67203

KENTUCKY

APPLE SIDERS OF CINCINNATI, c/o GARY JOHNSTON, PRESIDENT, 27 CRYSTAL LAKE DR., COVINGTON, KY 41017
C'BUG THE COMMODORE BARDSTOWN USER GROUP, PO BOX 165, BARDSTOWN, KY 40004, 502-348-6380
COLOR COMPUTER OF LEXINGTON, c/o SCOTT SEHLHORST, 3401 TISDALE DR., LEXINGTON, KY 40503
KENTUKIANA 99/4 COMPUTER SOCIETY, 9801 TIVERTON WAY, LOUISVILLE, KY 40222
KIPBUG, PO BOX 3564, LOUISVILLE, KY 40201, PRES. ROBERT D. HASTINGS, PHONE - (502)589-0254
L.U.C.K.Y. (LOUISVILLE USERS OF COMMODORE IN KENTUCKY), c/o DAVE BOROUGHS, PO BOX 22244, LOUISVILLE, KY 40222
OWENSBORO MICRO COMPUTER CLUB, 3936 YATES DR., OWENSBORO, KY 42301
THE COMMODORE CONNECTION, c/o JIM KEMP, 1010 S. ELM, HENDERSON, KY 42420

LOUISIANA

ATARI PROGRAM ENTHUSIASTS OF SLIDELL, 117 DRURY LN., SLIDELL, LA 70460, 504-649-6586
B.R.A.G., BATON ROUGE ATARI GROUP, 1955 DALLAS DR., BATON ROUGE, LA 70806
BATON ROUGE COMPUTER CLUB, PO BOX 80648, BATON ROUGE, LA 70898-0648
BATON ROUGE PC USERS GROUP, c/o TOMWICHSE, 3375 KING BRADFORD, BATON ROUGE, LA 70816
COMMODORE PET USERS GROUP, WAYNE LOWDRY, PRES. 5064 BOWDEN ST., MARRERO, LA 70072
INTERNATIONAL APPLE CORE, PO BOX 976, DALY CITY, LA 70417
LA TRS-80 USERS GROUP, PO DDRAWER 627, MONTEGUT, LA 70377
MEGA CITY 1, PO BOX 187, JACKSON, LA 70748
N.E.L.A.C., NORTHEAST LOUISIANA APPLE CLUB, C/O DR. HARPER GAUSHELL, PRES., ROOM 280, STRAUSS HALL, NORTHEAST LOUISIANA UNIVERSITY, MONROE, LA 71209

MAINE

ACE, MAPLETON ELEMENTARY SCHOOL, MAPLETON, ME 04757
COLOR COMPUTER MAGAZINE, HIGHLAND MILL, CAMDEN, ME 04843
99/4A USER GROUP OF SOUTHERN MAINE, ATT: JOHN LEEKE, R.R.1 BOX 847, SANFORD, ME 04073

SOUTHERN MAINE TRS-80 USERS GROUP, 82 WELLINGTON ROAD, PORTLAND, ME 04103
TRANET, PO BOX 567, RANGELEY, ME 04970

MARYLAND

ANN-APPLE USERS GROUP, 266 HILLSMERE DRIVE, ANNAPOLIS, MD 21403. ATTN: WAYNE MECKLING, (301) 263-4053
ASSN. OF PERSONAL COMPUTER USERS, 3602 SANDY COURT, KENSINGTON, MD 20895
BALTIMORE COMMODORE USERS GROUP, 3121 ABEL AVENUE, BALTIMORE, MD 21218. ATTN: PAUL MOSCITT
CAPITOL AREA TIME/SINCLAIR USERS GROUP, PO BOX 725, LEXINGTON PARK, MD 20653
CHESAPEAKE MICROCOMPUTER CLUB, INC., 1618 TILTON DR., SILVER SPRING, MD 20902
CUMBERLAND VALLEY APPLE USER'S GROUP, 806 FREDERICK ST., HAGERSTOWN, MD 21740
E-COM USERS GROUP, INC., BOX 888, RIVERDALE, MD 20737, C/O DELIA TWOOP
EDISON COMMODORE USERS GROUP, 4314 OXFORD DR., SUITLAND, MD 20746
FREDERICK APPLE CORE, 1835 MEADOWGROVE LANE, FREDERICK, MD 21701
GATHERSBURG C-64 USERS GROUP, 12937 PICKERING DR., GERMANTOWN, MD 20874
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JUMPERS 2064s (GLEN BURNIE), 7837 B&A BLVD., GLEN BURNIE, MD 21061
MBC NEWS SANYO USERS NEWSLETTER INT'L, 816 EASLEY ST., STE. 615, SILVER SPRING, MD 20910
MUMPS USERS GROUP, 4321 HARTWICK RD., #308, COLLEGE PARK, MD 20740
NEC USERS GROUP, 7121 LORY LN., LANHAM, MD 20706
PRINCE GEORGE'S SINCLAIR USERS GROUP, PO BOX 725, BLADENSBURG, MD 20710, JIM WALLACE
ROCKVILLE VIC64 USERS GROUP, PO BOX 8805, ROCKVILLE, MD 20856
SOUTHERN MD COMMODORE USERS GROUP, 6800 KILLARNEY ST., CLINTON, MD 20735
SOUTHERN MARYLAND APPLE USERS GROUP, PO BOX 398, LEXINGTON PARK, MD 20653
TELECOMMUNICATIONS FOR THE DEAF, 5702 FOREST RD., CHEVERLY, MD 20785
THE BOYDS CONNECTION, 21000 CLARKSBURG, RD., BOYDS, MD 20841
THE COMPUCATS, 680 WEST BEL AIR AVENUE, ABERDEEN, MD 21001
THE MONTGOMERY COUNTY COMMODORE COMPUTER SOCIETY, PO BOX 6444, SILVER SPRING, MD 20906, (301) 946-1564
TRS-80 USERS GROUP OF BALTIMORE, 102 N. COLLINGTON AVE., BALTIMORE, MD 21231
VICIQUE (LINTHICUM HEIGHTS), 105A, CODDIUT ST., ANNAPOLIS, MD 21401
WASHINGTON APPLE PL, 8227 WOODMONT AVE., SUITE 201, BETHESDA, MD 20814

MASSACHUSETTS

APPLESAUCE, 118 BROOKHAVEN DR., E. LONGMEADOW, MA 01208
APPESEED, THE CENTRAL MASSACHUSETTS APPLE USERS GROUPS, PO BOX 62, WORCESTER, MA 01614
BOSTON COMPUTER SOCIETY, 17 CHESTNUT ST., BOSTON, MA 02108
BOSTON KAYPRO USERS GROUP, 3 CENTER PLAZA, BOSTON, MA 02108
MICRO, PO BOX 6502, CHELMSFORD, MA 01824
MAGNETIC (TI 99/4A), 57 RIVER RD., ANDOVER, MA 01810
MITRE SMALL COMPUTER SOCIETY, MITRE CORP., C/O M. THEODORE, BEDFORD, MA 01730
NBE BIRD WATCHERS' COMPUTER CLUB, 31 PLUMMER AVENUE, NEWBURYPORT, PA 01950
NEW ENG. COMP SOC, PO BOX 198, BEDFORD, MA 01730
NEWTON APPLE KIDS, 77 ROCKPORT RD., WESTON, MA 02153
NORTH SHORE APPLE GROUP, PO BOX 59, ROCKPORT, MA 01966
PET USERS GRP, WALTHAM HS. NOSTON, MA 02154
SMUDGE (DIGITAL GROUP), C/O JEB BOSWELL, M.D., 29 KENILWORTH ST., NEWTON, MA 02158
SYNTAX - THE HARVARD GROUP, RD. 2, BOX 457, HARVARD, MA 01451
THE APPLE GUILD, PO BOX 371, WEYMOUTH, MA 02188
THE BOSTON COMPUTER SOCIETY, ONE CENTER PLAZA, BOSTON, MA 02108
TRUGEM - TRS-80 USERS GROUP OF E. MA., C/O M. SLATE, 42 OAK HILL RD., SUDBURN, MA 01776

MICHIGAN

ALTERNATE SOURCE, 704 N. PENNSYLVANIA AVE., LANSING, MI 48905
APPLE L.U.G., PO BOX 271, HASLETT, MI 48840
BASIC 99ER'S, 1504 S. VASSAR RD., BURTON, MI 48509, (313) 742-1329
BASIC VIC, C/O BRIAN BROWN, 1504 S. VASSAR, BURTON, MI 48509, (313)742-1329
BATTLE CREEK MICROCOMPUTER CLUB, 8587 Q DR., NORTH BATTLE CREEK, MI 49017
CAPITOL HILLA TARI OWNERS SOCIETY (C.A.O.S.), PO BOX 16132, LANSING, MI 48901
CENTRAL MI TRS 80, 220 E. KALAMAZOO, LANSING, MI 48932
CENTRAL MICHIGAN TRS-80 USERS GROUP, 1309 WOODINGHAM DR., EAST LANSING, MI 48823
COLOR COMPUTER OWNER'S GROUP, PO BOX 1113, DEARBORN, MI 48121
DETROIT INTERACT GROUP, 15356 PREVOST, DETROIT, MI 48227
DETROIT FIRST OSBORNE USERS GROUP, 17452 STAMWICK, LIVONIA, MI 48152, (313) 422-0928
ERCC (EDUCATIONAL, RECREATIONAL COMPUTER CLUB), PO BOX 325, OWASSO, MI 48867
Himi 65XX-68XX USER GROUP, PO BOX 4310, FLINT, MI 48504
GRAND RAPIDS APPLE (GRAPPLE), 5326 BROOKWOOD DR.

S.E. KENTWOOD, MI 49508
GREAT LAKE 99ER'S, PO BOX 7151, ROSEVILLE, MI 48305
HEATH USER'S GROUP, HILLTOP RD., ST. JOSEPH, MI 49085
KALAMAZOO AREA COMPUTER ASSOCIATION, 1927 WINCHELL AVE., KALAMAZOO, MI 49008
LAKE SHORE COMPUTER USERS, PO BOX 5062, MUSKEGON, MI 49445
MACE - MICHIGAN ATARI COMPUTER ENTHUSIASTS, PO BOX 2785, SOUTHFIELD, MI 48037
MICHIGAN APPLE COMPUTER CLUB, PO BOX 551, MADISON HEIGHTS, MI 48071
NATIONAL TRS-80 MODEL II USERS GROUP, PO BOX 234, ADA, MI 49301
SAULT AREA TRS-80 USERS GROUP, C/O JACK DECKER, 1804 WEST 18TH ST. #155, SAULT STE. MARIE, MI 49783
SCREAMING EAGLES, C/O CLARENCE PERRY, 1131 GREENBRIAR, JEROME, MI 49249
SEMCO, SOUTH EASTERN MICHIGAN COMPUTER ORGANIZATION, PO BOX 02426, DETROIT, MI 48202
SORCERER'S APPRENTICE, PO BOX 33, MADISON HEIGHTS, MI 48071
TRL-C.U.G., COMMODORE USERS GROUP, PO BOX 45, BAY CITY, MI 48706, C/O MARK D. MEYERS
WEST OAKLAND COMPUTER USERS GROUP (TRS-80), 1691 EASON, PONTIAC, MI 48054

MINNESOTA

CP/M USERS GROUP OF MINNESOTA, C/O JONATHAN THOMAS, 8040 N.E. GROVELAND RD., MONDSVIEW, MN 55432
HEARTLAND AREA COMPUTER COOPERATIVE, RT. 4, BOX 204, LITTLE FALLS, MN 56345
MINNAPPLES, PO BOX 796, HOPKINS, MN 55343
MINN COMP SOC, 8100 34TH AVE. S., MINNEAPOLIS, MN 55401
MSP 99 USERS GROUP, PO BOX 12351, ST. PAUL, MN 55112
99 COMPUTER GROUP, 5916 FRANCE AVE. S., EDINA, MN 55410
ORGANIZATION OF SOUTH EASTERN MINNESOTA OHIO SCIENTIFIC USERS (OSMOSUS), 3218 SILVER LAKE RD., MINNESOTA, MN 55418
SMUGH (ST. PAUL - MINNEAPOLIS) USERS GROUP - (HEATH), 8895 72ND ST., COTTAGE GROVE, MN 55016
THE REAL APPLE, 395 WOODLAWN AVE., ST. PAUL, MN 55105

MISSISSIPPI

ATARI USERS GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709
BILOXI COMMODORE USERS GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709
CANTON COLOR COMPUTER CLUB (TRS-80), C/O WADER HAMPTON, PO BOX 87037, CANTON, MS 38187
FRANKLINAPPLE USERS GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709
GUM TREE COMPUTER CLUB TRS-80 & APPLE, 2609 PEMBERTON, TUPELO, MS 38801, C/O RICHARD SWINEY
IBM USER GROUP, 3002 HWY. 90 E., OCEAN SPRINGS, MS 39564, 601-875-1173
IBM USER GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709
MISSISSIPPI STATE UNIVERSITY MICROCOMPUTER USERS GROUP, C/O DR. GENE BOGGESS MSU COMPUTER CENTER, PO DRAWER CC, MISSISSIPPI STATE, MS 39762, 601-325-2942
O.S.U.G., OCEAN SPRINGSTHE COASTAL AREA ATARI USERS GROUP, PO BOX 5098, BILOXI, MS 39534. ATTN: LEE HITCHESON (601) 388-2836
SOFTWARE SOURCE, 4550 W. BEACH BLVD., BILOXI, MS 39531
TRS 80 USERS GROUP, 3002 HWY 90 E. OCEAN SPRINGS, MS 39564, 601-875-1173
TRS 80 USERS GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709
UNIVERSAL COMPUTER SERVICES, 3002 HWY 90E, OCEAN SPRINGS, MS 39564
VIC 20 USERS GROUP, 3002 HWY 90E, OCEAN SPRINGS, MS 39564, 601-875-1173
VIC 20 USERS GROUP, 4550 W. BEACH BLVD., BILOXI, MS 39534, 601-388-4709

MISSOURI

APPLEJACKS OF ST. LOUIS, C/O KENT D. WILBUR, 12 JENY LIND DR., ST. PETERS, MO 63376
COLUMBIA KAYPRO USERS GROUP, CMS STORE, HITT & BROADWAY, COLUMBIA, MO 65201
GREATER KANSAS CITY TRS-80 USERS, PO BOX 27, BELTON, MO 64012
JOPLIN APPLE USER GROUP, 1903 E. 36TH, JOPLIN, MO 64801
KANSAS CITY AND INDEPENDENCE PET USERS GROUP, 10524 LAKE DR., INDEPENDENCE, MO 64053
NORTH COUNTY TRS-80 USERS GROUP, 12 VILLE DONNA COURT, HAZELWOOD, MO 63042
ST. LOUIS COMPUTER GROUP, 5600 CLAYTON RD., ST. LOUIS, MO 63110
ST. LOUIS 99ERS, 3429 PESTA LOZZI, ST. LOUIS, MO 63118
SLACC, POB 28924, ST. LOUIS, MO 63132
SLUG - ST. LOUIS KAYPRO USERS GROUP, C/O JOANNA DANEMAN, BOX 31126, ST. LOUIS, MO 63131

MONTANA

BIG SKY APPLE USERS GROUP, 3400 5TH AVE. SOUTH, GREAT FALLS, MT 59405

NEBRASKA

COMPUTERS, C/O ROCKY & DOROTHY FRIEND, PO BOX 2064, HASTINGS, NE 68901
LINCOLN MICRO-COMPUTER CLUB, 1209 GARBER AVE., LINCOLN, NE 68521
LNU USERS, 4345 MANCHESTER RD., GRAND ISLAND, NE 68801
MID AMER. COMP. COMM FED S L. BELLEVUE, NE 68005

MID-AMERICA COMPUTER HOBBYISTS (MACH), PO BOX 13303, OMAHA, NE 68113
OMAHA APPLE SAUCE, 3103 S. 32 AVE., OMAHA, NE 68105

NEVADA

LAS VEGAS TRS-80 USERS GROUP, 1941 ASHANER LN., LAS VEGAS, NV 89115

NEW HAMPSHIRE

NEW HAMPSHIRE ATARI COMPUTER CLUB, 346 S. TAYLOR ST., MANCHESTER, NH 03103
NO N ENG COMP SOC, 2500 RIVER RD, NH 03104
SEACOAST MICRO-COMPUTER CLUB, 3 PINE ST., ROLLINSFORD, NH 03869, C/O LESLIE

NEW JERSEY

AMATEUR COMPUTER GROUP OF NJ, PO BOX 319, SOUTH BOUND BROOK, NJ 08880. ATTN: RUSSEL CORR
AMATEUR COMPUTER GROUP OF NEW JERSEY APPLE CLUB, 5 BAYBERRY CLOSE, PISCATAWAY, NJ 08854
APPLE JACK, 7 STONEHENGE RD., MORRISTOWN, NJ 07960, 201-538-8746
CENTRAL JERSEY COMPUTER CLUB, C/O RICHARD H. WILLIAMS, RT. #1 BOX 147, HOPEWELL, NJ 08525
COMPUTER CLUB OF OCEAN COUNTY, 1319 GEORGIAN TERRACE, LAKEWOOD, NJ 08701
COMPUTER CLUB OF OCEAN COUNTY, 400 SURF AVENUE, BEACHWOOD, NJ 08722
COMPUTER WORKSHOP ATARI USERS GROUP, 1200 HAD- DONFIELD RD., CHERRY HILL, NJ 08002
EWING APPLE USERS GROUP, C/O BOB AUSTIN, NJ SCHOOL FOR THE DEAF, WEST TRENTON, NJ 08628
JERSEY ATARI COMPUTER GROUP, 58 DEWEY AVE., HIGH BRIDGE, NJ 08829
LABCOM USERS GROUP, DARTMOUTH-HITCHCOCK MEDICAL CENTER, HANOVER, NJ 03756
JERSEY ATARI COMPUTER SOCIETY, C/O NEIL SHERMAN, 1908 WEST POINT DR., CHERRY HILL, NJ 08003
MID-JERSEY EXECUTIVE COMPUTING GROUP, C/O DR. C.T. PHAN, RIDGE COLLEGE, POB 6400, LAWRENCEVILLE, NJ 08648
MID-JERSEY PC GROUP, GRADUATE PROGRAM FOR ADMINISTRATORS, POB 6400, LAWRENCEVILLE, NJ 08648
MONMOUTH COUNTY APPLE USERS GROUP, SEAVIEW SQUARE MALL AUDITORIUM, RT 35 AND RT 66, WANAMASSA, NJ
MORRIS COUNTY TIMEX USERS GROUP, LARRY SPENCER, 6 FOREST CT., MORRIS PLAINS, NJ 07950
NEW JERSEY USERS GROUP, RD-1, 40 WOODLAWN TER- RACE, LK. HOPATCONG, NJ 07849
NEW YORK (MID) LUBE GROUP, 1 MARK RD, KENILWORTH, NJ 07033
NORTH JERSEY TRS-80 USERS GROUP, C/O DR. HOWARD SILVER, FAIRLEIGH DICKINSON UNIVERSITY, TEANECK, NJ 07666
NORTH JERSEY COMPUTER USERS GROUP, PO BOX 382, SPARTA, NJ 07871
NORTHERN NJ COMPUTER CLUB, C/O HERMAN SACHS, 6 BRYSON RD., FAIRLAWN, NJ 07410
THE APPLE COMPUTER CLUB, C/O R.L. BARNES, RM 6D-214, BELL LABS, MURRAY HILL, NJ 07974
THE CENTRAL JERSEY 99 COMPUTER CLUB, PO BOX 673, BRICK, NJ 08723, C/O THEODORE E. MOZER, III
TEH COMPUTER/INVESTOR USERS GROUP, 36 HIGHLAND AVENUE, METUCHEN, NJ 08840
TI USERS, NEWJUG, 981 TOWNLEY AVE., UNION, NJ 07083
TRS-80 USERS GROUP OF CHERRY HILL, BRYAN P-PHEE - PRESIDENT, 418 VIRGINIA DR., BROWNS MILLS, NJ 08015
TRS-80 USERS GROUP OF MONMOUTH COUNTY, 80 BINGHAM AVENUE, RUMSON, NJ 07760

NEW MEXICO

APPLEQUERQUE COMPUTER CLUB, 6609 E. ORPHELIA AVENUE N.E., ALBUQUERQUE, NM 87109
ROCKS GROUP, GALLUP AEROSTAT SOCIETY, 1203 KIVA, GALLUP, NM 87301
THE SANTA FE COMPUTER CLUB, PO BOX 2261, SANTA FE, NM 87504

NEW YORK

AMA, 135 W. 50TH ST., NEW YORK, NY 10020
ANSI, 1430 BROADWAY, NEW YORK, NY 10018
APPLE BYTTERS CORPS, C/O HANK KOLK, 171 TREEHAVEN RD., BUFFALO, NY 14215
BASIS 108 USERS, C/O PERSONALCOMPUTER SERVICE, 52 JACKSON DRIVE SOUTH, POUGHKEEPSIE, NY 12603
CPA APPLE USERS GROUP, C/O BARRY LEIF, 469 SEVENTH AVE., NEW YORK, NY 10018
CP/MAPPLE USERS GROUP, 737 EMPIRE AVENUE, FAR ROCKAWAY, NY 11691
CP/M USERS GROUP, 345 E. 86 ST., NEW YORK, NY 10028
CP/M USER GROUP, RT. 1 BOX 244, MILL RD., YAPHANK, NY 11980
COCO NEWS, 3 BOHR CT., SPRING BALLE, NY 10977
COLOR COMPUTER CLUB OF NEW YORK, 347 WEST 48TH ST., NEW YORK, NY 10036
COMPUTER CLUB OF AMERICA AND EXCHANGE, PO BOX 784, BRONX, NY 10473
CRAB APPLE, PO BOX 268, WEST NYACK, NY 10994
DATA GENERAL USERS GROUP, C/O DAVE BELLIN, PO BOX 929, RIVERDALE, NY 10463
DIGITAL GROUP INDEPENDENT USER'S GROUP, PO BOX 316, WOODMERE, NY 11598
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FORTH INTEREST GROUP, C/O TOM JUNG, 7-04 166 STREET, 88, BEECHURST, NY 11357
HEATH USERS GROUP OF NJ, C/O RALPH BRADBURN, 300 RT. 59, TALLMAN, NY 10982
HEATH USERS GROUP OF NJ (HUGNA), C/O RALPH BRAD- BURN, 300 RT. 59, TALLMAN, NY 10982
INTERCALC, PO BOX 254, SCARSDALE, NY 10583
JERI-HUG, 'THE HEATH USERS GROUP', C/O HEATHKIT

ELECTRONICS, 15 JERICHO TURNPIKE, JERICHO, NY 11753
JINSAM USERS GROUP, C/O JAMES P. ISCARO, PRES., BOX 274, RIVERDALE, NY 10463
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KINGS BYTE NEWSLETTER, 1063 EAST 84TH STREET, BROOKLYN, NY 11236
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LIST (LON GISLAND SINCLAIR-TIMEX) GROUP, 10 IDLE DAY DRIVE, CENTERPORT, NY 11721
LNU USERS GROUP, RT. 1 BOX 244, MILL RD., YAPHANK, NY 11980
LONG ISLAND COMPUTER ASSOC., PO BOX 71, HICKSVILLE, NY 11802
LONG ISLAND NEC USERS GROUP, 75 WEAVING LN., WAN- TACH, NY 11793
METRO TRS-80 USERS GROUP, C/O GEORGE MUEDEN, 310 WEST 106 STREET, 15D, NEW YORK, NY 10025
MICROAGE ATARI COMPUTER USER'S GROUP, PO BOX 200, HENRIETTA, NY 14467
MICRO-COMPUTER BUSINESS USERS GROUP, 161 W. 75 ST., NEW YORK, NY 10023
MOD 4 USERS GROUP, 1578 E. 26 ST., BROOKLYN, NY 11229
N.E.C.A., 11 DICKENS AVE., DIX HILLS, NY 11746
NATIONAL ADVANCED STOCK/COMMODITY MICRO GROUP, LOCK BOX 407, NEW YORK, NY 11362
NYU DISABLED STUDENT SERVICES, 566 LAGUARDIA PLACE, ROOM 701, NEW YORK, NY 10012
NEW YORK AMATEUR COMPUTER CLUB, INC., PO BOX 106, CHURCH ST. STATION, NYC, NY 10008
NORTH COUNTY TRS-80 2 & 16 CLUB, 24 WOODLAND TER- RACE, LAKE PLACID, NY 12946
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ROCHESTER AREA COMP, 1 LOMB MEM DR., ROCHESTER, NY 14623
S-100/CPM USER'S GROUP, PO BOX 106, CHURCH ST. STA- TION, NEW YORK, NY 10008
SCHENECTADY HUG, C/O T. BUDGE, 75 SANDERS, ST. SCOTIA, NY 12302, WALTER HIPPLE 385-5660
SINCLAIR COMPUTER USER'S SOCIETY (SINCUS), PO BOX 36, JOHNSON CITY, NY 13790
SOUTHERN TIER APPLE USER'S GROUP, (S.T.A.U.G.), PO BOX G, BREESEPORT, NY 14816
STATEN ISLAND APPLE USERS GROUP, PO BOX 141, STATEN ISLAND, NY 10305
SUFFOLK COUNTY COMPUTER ASSOCIATION, RT. 1, BOX 244, MILL RD., YAPHANK, NY 11980
SYBIL'S M.U.G. UG, RT 52, CARMEL, NY 10512
SYRACUSE APPLE USERS GROUP, PO BOX 6586, SYRACUSE, NY 13217
SYRACUSE ATARI USERS GROUP, 103 WOODSPATH ROAD, LIVERPOOL, NY 13088
SYRACUSE OSBORNE USERS GROUP (SOUP), C/O MARTIN SHAPIRO, 601 CLAREDON ST., SYRACUSE, NY 13201
THE BASIS GROUP INT'L, NEW YORK CHAPTER, C/O BILL BASCH, 127 MADISON AVE., 2ND FLOOR, NEW YORK, NY 10016
THE DATAMERICA COMPUTER USER'S GROUP, 312 E. 84 ST. #1A, NEW YORK, NY 10028
THE ROCHESTER S-80 COMPUTER CLUB INC., PO BOX 15476, ROCHESTER, NY 14615
THE SYRACUSE APPLE USERS GROUP, PO BOX 6586, SYRACUSE, NY 13217
TRS 80 USER GROUP, RT. 1, BOX 244, MILL RD., YAPHANK, NY 11980
TRS-80 USERS GROUP OF CENTRAL NEW YORK, 2362 EAST LAKE ROAD, SKANEATELES, NY 13152
U.A.U.G., C/O UPSTATE COMPUTER SHOP, 99 COMMER- CIAL DR. 5A, WHITESBORO, NY 13492
VAN RENSSALAER COMPUTER USER GROUP, ST. AN- THONY ONHUDSON, WASHINGTON AVE., RENSALEER, NY 12144
WESTCHESTER FAIRFIELD AMATEUR COMPUTER SOCIE- TY, R.R. 1, BOX 176, POUND RIDGE, NY 10576
WESTCHESTER PET USER GROUP, PO BOX 1280, WHITE PLAINS, NY 10602

NORTH CAROLINA

ACUSOFT ATARI COMPUTER USER'S SOCIETY OF FAYET- TENVILLE, PO BOX 1117, FAYETTEVILLE, NC 28302
APPLE CLUB OF FAYETTEVILLE, PO BOX 70, FAYET- TENVILLE, NC 2802
CAPE FEAR COMPUTER AND HEATH USER'S GROUP, 2454 VANDEMERE AVENUE, FAYETTEVILLE, NC 28304
CAROLINA APPLE CORE, 5212 INGLEWOOD LN., RALEIGH, NC 27609
CHARLOTTE 99/4A USERS, 2637 CONNEMARA DR., MAT- THEWS, NC 28105
CHARLOTTE 99/4A USERS, 2637 CONNEMARA DR., MAT- THEWS, NC 28105
GEMS, GREENSBORO EIGHTY MICROCOMPUTER SOCIE- TY, PO BOX 10014, GREENSBORO, NC 27404
GULFORD 99ER USERS GROUP, (TI 99/4A), PO BOX 21691, GREENSBORO, NC 27420
MICRO COMPUTER USERS CLUB, RT. 1 BOX 134-A, BOON- VILLE, NC 27011
MICRO COMPUTER USERS GROUP OF RALEIGH, 5225 N. BOULEVARD, RALEIGH, NC 27604
NATAHALA COMPUTER CLUB (99ERS), RT. 3, BOX 64-E, ROBINSVILLE, NC 28771
NATIONAL COMPUTER SOCIETY, PO BOX 41205, FAYET- TENVILLE, NC 28304-0007
NATIONAL SOCIETY OF MICROCOMPUTER USERS AND GROUPS, PO BOX 8084, GREENVILLE, NC 27834
PIEDMONT TRIAD ATARI USERS GROUP, 6104 KNIGHT ROAD, GREENSBORO, NC 27410
RALEIGH COLOR COMPUTER CLUB, PO BOX 581, GARNER, NC 27259 C/O DAVID ROPER

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LIST YOUR CLUB'S NAME AND ADDRESS COMPLIMENTS OF COMPUTER SHOPPER

Call or Write: (305) 269-3211; P.O. Box F, Titusville, FL 32780

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TACS, PO BOX 7073, GREENSBORO, NC 27417-0073
TIMEX USERS GROUP, RT. 3 BOX 64E, ROBINSVILLE, NC 28771
TRIAD AMATEUR COMPUTER SOCIETY, PO BOX 7073, GREENSBORO, NC 27417
WILMINGTON TRS-80 USERS GROUP, 1605 PRINCESS ST., WILMINGTON, NC 28401
WILSON TRS-80 USER'S GROUP, PO BOX 336, LUCAMA, NC 27851

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M.A.D. H.U.G. 994A, DENNIS SCHJELDAHL, 509 REEVES DRIVE, GRAND FORKS, ND 58201
TRS-80 COLOR COMPUTER CLUB, PO BOX 218, MINOT, ND 58701

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AMATEUR COMPUTER SOCIETY OF CENTRAL OHIO (ACSCO), PO BOX 28355, COLUMBUS, OH 43228-0355
APPLE SIDERS, C/O DAN MCKEE, 5001 RELLEUM AVE., CINCINNATI, OH 45238
APPLE-DAYTON USERS GROUP, POB 1666, FAIRBORN, OH 45324
ATARI USERS GROUP, 6895 N. HIGH ST., WORTHINGTON, OH
CCC (RS COLOR CPU), PO BOX 478, CANFIELD, OH 44406-0478, C/O ED GINNY KOMARA
CENTRAL OHIO COMMODORE USERS GROUP, 107 S. WESTMOOR AVE., COLUMBUS, OH 43204
CIN-DAY TI USER GROUP, PO BOX 519, WEST CHESTER, OH 45069-0519
CINCINNATI COMP CLUB, 6515 KENVIEW DR., CINCINNATI, OH 45243
CINCINNATI COMPUTER CLUB, @@@ CONVERSE DRIVE, CINCINNATI, OH 45240
CINCINNATI TRS-80 USERS GROUP, 5380 BAHAMA TERRACE, APT. 8, CINCINNATI, OH 45233
CINCINNATI TRS-80 USERS GROUP, 3211 MARYLAND AVE., CINCINNATI, OH 45204
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COLOR COMPUTER CLUB, PO BOX 478, CANFIELD, OH 44406
COLUMBUS CPIM-ACSCO USERS, BOX 28355, COLUMBUS, OH 43228-0355
COLUMBUS MAX80 USERS, (M.A.X.U.G.), BOX 28355, COLUMBUS, OH 43228-0355
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DELAWARE OHIO VIC-20 USERS GROUP, PO BOX 216, NEW ALBANY, OH 43054, C/O TOM MARTIN 855-2404
GOODYEAR COMPUTER CLUB, GOODYEAR TIRE CO., AKRON, OH 43316
NEO APPLE CORP., BOB CALDWELL, 10112 RIDGEWOOD DR., TWINSBURG, OH 44087
NEO APPLE CORPS, C/O NORM HENKE, 21750 MILLER AVE., EUCLID, OH 44119
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NORTHEAST OHIO COMMODORE USERS GROUP, 5104 MAYFIELD DR., LYNDRHURST, OH 44124
OH-MI-TI, DON WOLLENBECKER, 1522 RESWICK, OREGON, OH 43616
OSBORNE USERS OF COL., OHIO INST. OF TECH, 1350 ALUM CREEK DR., COLUMBUS, OH 43209, C/O BILL HOOKER/DALE BROWN
OSI NORTH COAST USER'S GROUP, 30600 NAMHAHASSET RD., BAY VILLAGE, OH 44140
ROBOTICS USERS GROUP, APRIL LANE, COL., OH
RUBBER APPLE USERS GROUP, ROBERT M. NEBIKER, 1870 BROOKFIELD DRIVE, AKRON, OH 44313
SAUCE, STARK APPLE USERS COOPERATIVE EXCHANGE, PO BOX 35091, CANTON, OH 44735
SCREAMING EAGLES, C/O DAVID YAROS, 1006 2ND NAT'L BLDG., CINCINNATI, OH 45202
THE LAKE ASHTABULA IBM PC USERS GROUP, PO BOX 175, MADISON, OH 44057
THE PSYCHOLOGICAL - COMPUTER - CLUB, 2118 FOREST LAKE DRIVE, CINCINNATI, OH 45244
TIMEX/SINCLAIR USERS GROUP, 4255 S. HAMILTON, COL., OH

TRI-STATE OSI USERS, C/O TED MORRIS, 6306 KINCAID RD., CINCINNATI, OH 45213
TRS-80 - ACSCO, BOX 28355, COLUMBUS, OH 43228
TRS-80 COLOR COMPUTER USERS GROUP, 527 MALVERN DRIVE, PAINESVILLE, OH 44077, C/O ANTHONY RUQUE
TUSCARAWAS COUNTY PERSONAL COMPUTER CLUB, C/O ROBERT D. HOBART, 231 5TH DR. NW., NEW PHILADELPHIA, OH 44663
Z80 NEVADA COBOL USER'S (NUG), BOX 28355, COLUMBUS, OH 43228

OKLAHOMA

AUTUMN REVOLUTION, PO BOX 55329, TULSA, OK 74115, (918) 663-3436
BIG RED APPLE GROUP, 2301 W. MAIN ST., NORMAN, OK 73069
OKLAHOMA LOCAL OSBORNE GROUP, PO BOX 1851, BETHANY, OK 73008
TIMEX SINCLAIR USERS GROUP, C/O BILL CASEBEER, PO BOX 372, OLOGAH, OK 74053
TULSA COMPUTER SOCIETY, PO BOX 1133, C/O SI HAWK, TULSA, OK 74105, 918-744-1397

OREGON

APPLE BLOSSOM, PO BOX 266, DILLIARD, OR 97432
APPLEEUGENE, PO BOX 3267 EUGENE, OR 97403
ATARI COMPUTER ENTHUSIASTS, 3663 VINE MAPLE ST., EUGENE, OR 97405, C/O MICHAEL DUNN
CPIM USER'S GROUP NORTHWEST, 1346 N.E. 28TH, PORTLAND, OR 97232
DOCTOR'S COMPUTER COMMITTEE, 2188 SW PARK PLACE, PORTLAND, OR 97205
JACKSON AMATEUR COMPUTER SOCIETY, 2355 CAMP BAKER RD., MEDFORD, OR 97501
MICRO-CALC BUSINESS USERS GROUP, PO BOX 12039, SALEM, OR 97309
PACIFIC NORTHWEST COMMODORE USERS GROUP, PO BOX 2310, ROSEBURG, OR 97470
PORTLAND AREA TRS-80 USER'S GROUP, PO BOX 02500, PORTLAND, OR 97202
PORTLAND COMPUTER SOCIETY, PO BOX 5494, PORTLAND, OR 97208
PORTLAND IBM PERSONAL COMPUTER CLUB, 12260 SW 124TH AVE., TIGARD, OR 97223
PORTLAND IBM PERSONAL COMPUTER CLUB, PO BOX 2068, BEAVERTON, OR 97075
THE MICRO-80 GROUP TRS-80 USERS SOCIETY, C/O BOB WALTERS, PO BOX 1472, EUGENE, OR 97400
WILLAMETTE VALLEY COLOR COMPUTER USERS, C/O BRIAN JAMES, 1850 BAILEY HILL RD., EUGENE, OR 97405

PENNSYLVANIA

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APPLE USERS GROUP, NAVAL AIR DEVELOPMENT CTR, CODE 3013-MIKE, MOCENTER, WARMINSTER, PA 18976
ATARI COMPUTER USERS OF TEMPLE UNIV., C/O GLENN SNEELBECKER, 8905 PATTON RD., WYNDMOOR, PA 19118
CAPATUG, CAPITOL AREA TRS-80 USERS GROUP, 340 LEWISBERRY RD., NEW CUMBERLAND, PA 17070, MAX WORTHINGTON
CENTRAL PA. 994A USERS GROUP, THE POINT, I-83 AND UNION STREET DEPOSIT, HARRISBURG, PA 17111
CENTRE CO COMPUTER CLUB, WILLARD BLDG, UNIV PK., PA 16802
DELAWARE VALLEY COMPUTER SOCIETY, PO BOX 651, LEVITTOWN, PA 19058
ERIE APPLE CRUNCHERS, PO BOX 1575, ERIE, PA 16507
HARRISBURG PC USERS GROUP, 1195 FAIRMONT DR., HARRISBURG, PA 17112, 717-652-9097
INTERNATIONAL P.C. OWNER, INC., PO BOX 10426, PITTSBURGH, PA 15234
LEHIGH VALLEY HEATH USERS GROUP, 1425 N. BROAD ST., ALLENTOWN, PA 18104
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MONROEVILLE APPLE USER GROUP, 579 CARNIVAL DR., PITTSBURGH, PA 15239
NITTANY USERS OF TEXAS INSTRUMENTS, 625 BERSHIRE DRIVE, STATE COLLEGE, PA 16803
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SPACE, C/O DENSLAW, 14 PHEASANT CT., MECH. PA 17055
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TUG-DC, C/O GARY DITLLO, 1109 MADISON AVE., PROSPECT PARK, PA 19076
VALLEY ATARI COMPUTER CLUB, RD 2 COLEMAN DR., BEAVER, PA 15009
VALLEY FORGE TRS-80 USERS GROUP, 1000 VALLEY FORGE CIRCLE, KING OF PRUSSIA, PA 19406

WYOMING VALLEY COMPUTER CLUB, 302 WYOMING AVE., KINGSTON, PA 18704

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THE COMPUTER CLUB, 49 DESANO DR., NARRAGANSETT, RI 02882
RHODE ISLAND COMPUTER HOBBYISTS, PO BOX 599, BRISTOL, RI 02809

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COMMODORE USERS SOCIETY OF GREENVILLE, C/O HORIZON RECORDS-HOME COMPUTERS, 347 S. PLEASANT-BURG DR., GREENVILLE, SC 29607
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NONAME APPLE CLUB, C/O JAMES SUMNER, 80 DUNNEMANN AVE., CHARLESTON, SC 29403
THE COMPUTERNIKS, C/O USC CC BOOK STORE, PO BOX 1954, CONWAY, SC 29526

SOUTH DAKOTA

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ET 64 USERS GROUP, PO BOX 495, KNOXVILLE, TN 37901
HOLSTON VALLEY USERS GROUP, 310 WILLOW ST., MT. JARREL, TN 37642
K-TOWN 994A USERS GROUP, 3506 GARDEN DRIVE, KNOXVILLE, TN 37918, (615)687-8869
MEMPHIS AREA IBM-PC USERS GROUP, PO BOX 241756, MEMPHIS, TN 38124, C/O PETER VERMILYE
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AMATEUR RADIO CLUB, PO BOX 4391, WICHITA FALLS, TX 76308
APPLE PI, C/O CALY FRANCEL, 2105 ANDREWS HWY., ODESSA, TX 79761
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ATARI COMPUTER USER GROUP OF DALLAS, PO BOX 1118, ADDISON, TX 75001
AUSTIN TRS-80 USERS GROUP, PO BOX 43422, AUSTIN, TX 78745
BASIC SOCIETY - IBM USERS GROUP, BOX 815099, DALLAS, TX 75281
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CENTRAL TEXAS COMPUTER ASSOCIATION, PO BOX 4391, WICHITA FALLS, TX 76308
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COMPUUGLID TRS-80 GROUP, 2211 S. LIPSCOMB, AMARILLO, TX 79109
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CORPUS CHRISTI TRS-80 USERS GROUP, 6214 HIDDEN COVE, CIRPUS CHRISTI, TX 78412
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GROUP 80, DAVIS HALL, ARLINGTON, TX 76109
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KAYPRO CLUB OF AUSTIN, PO BOX 9791, AUSTIN, TX 78766
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PCUG (PERSONAL COMPUTER USERS GROUP), 1134 LINDA LEE, SAN ANGELO, TX 76905
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PERMAIN PC COMPUTER USERS GROUP, ODESSA COL.

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UTD RICHARDSON GRP, GREEN CTR RM 2 530, RICHARDSON, TX 45080
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WICHITA VALLEY TRS-80 USERS GROUP, (INCLUDES MODEL 1, MODEL 3 AND COLOR COMPUTER), PO BOX 4391, WICHITA FALLS, TX 76308, J. WESLEY B. TAYLOR, PRES.

UTAH

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ATARI COMPUTER ENTHUSIASTS OF UTAH, 5522 SARAH JANE DR., KEARNS, UT 84118
UTAH COMPUTER ASSOCIATION, 378 E. 9800 SO. SANDY, UT 84070

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RICHMOND HEATH USERS GROUP, 4302 SMITHDEAL AVENUE, RICHMOND, VA 23225

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AMRAD, PO DRAWER 6148, MCLEAN, VA 22106
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CAPITOL AREA COMMODORE ENTHUSIASTS, 2312 TANGLE VALE, VIENNA, VA 22180
CAPITOL AREA COMMODORE USERS, 2054 EAKINS COUT, RESTON, VA 22091
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FRANCONIA COMMODORE USERS GROUP, 6209 ROSE HILL DRIVE, ALEXANDRIA, VA 22310
FREDERICKSBURG COMPUTER CLUB, PO BOX 1011, COLLEGE STATION, FREDERICKSBURG, VA 22402
GREATER RICHMOND ATARI SUPPORT PROGRAM, 8720 COURTHOUSE ROAD, CHESTERFIELD, VA 23832
MICRO COMPUTER INVESTORS ASSOCIATION, 902 ANDERSON DRIVE, FREDERICKSBURG, VA 22405
PENTAF (PENTAGON), 9912 COLONY ROAD, FAIRFAX, VA 22030
OSIO (OHIO SCIENTIFIC) FOR VIRGINIA, MARYLAND AND DC AREA, 6605 FISHER AVENUE, FALLS CHURCH, VA 22046
PIONEER COMPUTER USER'S GROUP, PO BOX 604, LEXINGTON, VA 24450
RICHMOND HEATH USERS GROUP, C/O CARLOS CHAFIN, 4302 SMITHDEAL AVE., RICHMOND, VA 23225
RICHMOND TRS-80 USERS GROUP, 4115 HOPKINS RD., RICHMOND, VA 23234
SOC FOR APPLIED, 50 CULPEPPER, WARRENTON, VA 22186
TANDY COMPUTER USERS GROUP, PO BOX 2826, FAIRFAX, VA 22031
THE APPLE RESOURCE TEAM, 400 N. MEADOW STREET, RICHMOND, VA 23220
THE EPSON GAZETTE, 5140 APPLETREE DR., ROANOKE, VA 24019
THE LYNCH BURB MICRO COLOR USERS GROUP, 4717 TIDEWATER DR., LYNCHBURG, VA 24503, C/O CURTIS FINCH
TIDEWATER ATARI USERS GROUP, C/O IRWIN LENTCHNER, PO BOX 9492, 154 E. LITTLE CREEK RD., NORFOLD, VA 23505
TIDEWATER APPLE WORMS CLUB, 3025 VERDOME TERRACE, NORFOLK, VA 23509
TIDEWATER COMMODORE USERS GROUP, 4917 WESTGROVE RD., VIRGINIA BEACH, VA 23455, C/O FRED MONSON
TIDEWATER TRS-80 USER GROUP, PO BOX 10281, NORFOLD, VA 23513
WASHINGTON AREA C-64 (BURKE), PO BOX 93, MT. VERNON, VA 22121
WASHINGTON AREA C-64 USERS GROUP, 7426 ELDERADO ST., MCLEAN, VA 22201
WASHINGTON DC AREA TI HOME COMPUTER USERS GROUP, PO BOX 267, LEESBURG, VA 22075

WASHINGTON

APPLE, 6708 39TH AVE. SW., SEATTLE, WA 98136
APPLE COBBLETS, ATT: ROD TAYLOR, NORTH THURSTON HIGH SCHOOL, 600 SLEETER KINNEY NE, OLYMPIA, WA 98506, (206) 456-7682
CPM USERS GROUP, 803 EUCLID WAY, CENTRALIA, WA 98531
COMPUSEVER IBM PC SIG, 4910 43RD STREET NW, WASHINGTON, DC 20016
G.R.A.P.E., PO BOX 576, KEYPORT, WA 98345
INTERNATIONAL COMPUTER SOCIETY (ICS), C-2665 BUSBY ROAD, OAK HARBOR, WA 98277

INTERNATIONAL SOFTWARE SOCIETY, 2665 1250TH EAST, WHIPPY ISLAND, WA 98277
MEDICAL COMPUTER USERS GROUP, MADIGAN ARMY MEDICAL CENTER, TACOMA, WA 98431
NORTHWEST COMPUTER SOC., POB 4193, SEATTLE, WA 98104
OLYMPIA COMPUTER SOCIETY, 8540 MILL BIGHT RD. NE, OLYMPIA, WA 98506, ATTN: CHARLEY S. HEATH
PACIFIC NORTHWEST HEATH USERS GROUP (P.N.H.U.G.), C/O NATHAN A. HALL, PO BOX 993, BELLEVUE, WA 98009
PUGET SOUND TRS-80 USERS GROUP, C/O BURIE LIBRARY, 14700 6TH AVENUE S.W., SEATTLE, WA 98166
PUGET SOUND 99ER'S, TEXAS INSTRUMENTS USERS GROUP, PO BOX 6073, LYNNWOOD, WA 98036
"R" ATARI GROUP, 1691 BEECH LANE, OAK HARBOR, WA 98277
THE CONSTANT SOCIETY, PO BOX 45513, SEATTLE, WA 98105
WASHINGTON AREA USERS GROUP, *TIMEX/SINCLAIR, PO BOX 6239, WASHINGTON, DC 20015, ATT: STEVE WYATT
WENATCHEE VALLEY APPLE COMPUTER CLUB, DAVE HOFFMAN, 535 HIGHLAND DRIVE, WENATCHEE, WA 98801
Z-80 UNDERGROUND, 152 HARYU ROAD, LONGVIEW, WA 98632

WEST VIRGINIA

CAPTAIN COMMODORE, C/O JIM C. POLING, RT. #2, ST. GEORGE, WV 26290
CLARKSBURG AREA COMPUTER CLUB, 107 BOYD STREET, CLARKSBURG, WV 26301
MOUNTAIN STATE COLOR COMPUTER USERS GROUP, PO BOX 1084, MORGANTOWN, WV 26507
PERSONAL COMPUTER CLUB, 2107 CAPITOL DRIVE, PARKERSBURG, WV 26101

WISCONSIN

COMAL USERS GROUP, 5501 GROVELAND TERRACE, MADISON, WI 53716
DURANT COMPUTER CLUB, 901 S. 12TH STREET, WATER TOWN, WI 53094
MADISON COMPUTER SOCIETY, C/O J. SCHRENK, 3102 ASHFORD LN., MADISON, WI 53713
MEMOMIN - APPLE USERS GROUP, ALLEN KELSEY, SOFTWARE LIBRARIAN, 802 12TH AVE. E., MEMOMINE, 54751
MIDWEST INTERACTIVE COMPUTER, RESOURCE ORGANIZATION (MICRO), 34 PLEASANTVILLE CT., APPLETON, WI 54911
MILWAUKEE AREA COMPUTER, TECH. INST., PEWAUKEE, WI 53072
THE EAU CLAIRE ATARI USERS GROUP, 1406 1/2 MAPPA ST., EAU CLAIRE, WI 54701
TRS-80 UG MADISON, 201 W. MIFFLIN, MADISON, WI 53703

WYOMING

THE APPLE NET, 2203 PARK AVE., ORCHARD VALLEY, CHEYENNE, WY 82007

AUSTRALIA

BLUE MOUNTAINS COMPUTER CLUB, C1-6 HILLCREST AVE., FAULCON BRIDGE NSW 2776
KAOS, C/O DAVID ANNEAR, 49 MILLEWA CRES., DALLAS VIC 3047
OMEGA, C/O GEOFF COHEN, 72 SPOFFORTH ST., HOLT, ACT 2615
TASMANIAN USERS GROUP, C/O DAVID TASVER, 111 BASS HWY., WESTBURY TAS 7303

CANADA

MICRO ORDINATEUR MILLE - ILES, 673 CLAIRETTE, FABREVILLE, LAVAL QUEBEC H7P 2Y3
MONTREAL TRS-80 USERS GROUP, 1176 PHILLIPS PLACE, SUITE 021, MONTREAL, QUEBEC, CANADA H3B 3C8
QUEBEC ASSOCIATION DES UTILISATEURS D'ORDINATEURS DU QUEBEC, C.P. 685 SUCC. "H", MONTREAL QUEBEC H3G 2M6
QUEBECICANADA, ASSOCIATION DES UTILISATEURS D'ORDINATEUR DU QUEBEC, B.P. 122 SUCC. F. MONTREAL QUEBEC H3J 2K8
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APPLE USERS GROUP OF MUI, C/O BERT WILLIAMS, 47 TUCKETT ST., SAULT STE. MARIE, ONTARIO P6A 4G8
CANADIAN COMMODORE COMPUTER CLUB (CCCC), C/O STRICTLY COMMODORE, 47 COACHWOOD PLACE NW, CALGARY, ALTA., ALBERTA T3H1E1
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PRINTERS

DIABLO	List Price	Our Price
620 25CPS	1095	819
630 R-155 40CPS	2340	1775
630 KSR 40CPS	3325	2499
630 ECS/IBM 40CPS	2595	1949

EPSON	List Price	Our Price
FX-800 160CPS	699	499
FX-100 160CPS	899	679
RX-80 100CPS	399	295
RX-100 100CPS	699	529
RX-80FT 100CPS	499	379

NEC	List Price	Our Price
2010, 15, 30	950	739
2050	1250	839
3510, 15, 30	1795	1299
3550	2290	1599
7710, 15, 30	2450	1779

QUME	List Price	Our Price
Letter Pro-20 20CPS	899	719
Sprint 11/40	1681	1299
spring 11/55	1895	1499

COMREX	List Price	Our Price
CR-11 12CPS	599	469
CR-111 23CPS	995	759

TRANSTAR	List Price	Our Price
120P	599	479
130	895	699
140	1695	1229
T-315	599	485

OLYMPIA	List Price	Our Price
Compact NP 165CPS	499	379
Compact RO 14CPS	649	439

RITEMAN	List Price	Our Price
RTE + 120CPS	399	299
RTE 15 160CPS	799	599

PANASONIC	List Price	Our Price
KX1090	399	295
KX1091	499	329
KX1160	1799	1229

COMPUTERS

IBM	List Price	Our Price
PC w/64K, 2 DRIVES	2633	2149
PCXT W/128K, 10MEG DISK	4995	\$CALL

COMPAQ	List Price	Our Price
128K, W/2 DRIVES	2995	2499
PLUS	\$CALL	\$CALL

COLUMBIA	List Price	Our Price
MVP-PORTABLE	2995	2300
1600-1	3170	2545
1600-4	4770	3745

EAGLE	List Price	Our Price
PC + 1	2195	1779
PC + 2	2495	1995
PC + XL	4295	\$CALL
PC-2	3495	2400
Spirit 2 Portable	2995	\$CALL
Spirit XL Portable	4795	3295

SANYO	List Price	Our Price
MBC-550 W/1 160K Drive/Software	999	749
MBC-555 W/2 160K Drive/Software	1399	1049
MBC-550-2 W/1 320K Drive/Software	1199	899
MBC-555-2 W/2 320K Drive/Software	1699	1299

MONITORS

PANASONIC	List Price	Our Price
DT1000G 10" RGB Hires	449	299
DT1300D 13" RGB	500	379
TR120A 12" Amber	240	179
TR120G 12" Green	220	169

SAKATA	List Price	Our Price
SC100 13" Composite	329	255
SC200 13" Hires RGB	649	459
SC300 13" Super Hires RGB	899	659
SG1000 12" Hires Green	129	109

USI (2 year warranty)	List Price	Our Price
12" Green	199	113
12" Amber	225	123
14" Composite Color	398	299

COMREX	List Price	Our Price
12" Green	135	105
12" Amber	149	115
13" Composite Color	324	259
13" RGB Color	299	265
13" Hires RGB Color	649	469

TAXAN	List Price	Our Price
12" Green	190	119
12" Amber	180	129
410-12" Hires RGB	500	379
420-12" Super Hires RGB IBM	650	499

PRINCETON GRAPHICS	List Price	Our Price
HX-12	695	\$CALL

MODEMS

HAYES	List Price	Our Price
Smartmodem 300 Baud	289	209
Smartmodem 1200 Baud	699	489
Smartmodem 1200 B	599	439

SIGNALMAN	List Price	Our Price
Mark VII 300 Baud	160	119
Mark XII 300/1200 Baud	399	279
Hayes Compatible		

BOARDS

AST RESEARCH	List Price	Our Price
Comboplus w/64K 1 Part 1 ser	395	279
Comboplus w/256K 1 Part 1 ser	695	479
Megaplus w/64K 1 ser	395	279
Megaplus w/256K	845	599
Six Pack Plus w/64K	395	289
Six Pack Plus w/384K	895	589

QUADRAM	List Price	Our Price
Quadlink	680	499
Quadboard No Ram	295	219
Quadboard w/256K Expansion	675	519
Quadboard w/384K	795	609
Quadcolor I	275	219
Quadcolor II	295	225

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WORLDWIDE COMPUTERS

New Disk + Continued from page 44

compatible with IBM or CP/M or any permutations thereof. It provides instant cross compatibility for documents.

Another exciting feature of Disk+ is the File Transfer Utility. You can convert one of your other computers text files to Load into your M-100, or

TRS80 USERS — LOOK!

NEW HYPERZAP 3.1

Hyperzap is more than just another disk copying program. It is the program for analyzing, copying, repairing, creating floppy disks of all kinds. It will copy any TRS80 format as well as disks from many others such as CP/M IBM-PC, CoCo, etc. Specially designed to handle mixed density sectors on any track in any sequence. Many features for reading, writing, editing track and sector data. Hyperzap is the tool that lets you be in charge.

Make your own self booting disks. Take your own CMD file and turn it into a dual booting Mod I/III/IV disk.

New feature Autopilot mode allows learning, saving and repeating established techniques. Disk comes with fascinating examples.

Hardware needed: 48K 1 drive minimum. Mod 1 needs doubler. Double sided drives if you have them. Disk supplied runs on Models I, III and IV. 36 page manual

\$39.95 ppd

HYPERCROSS CPM-TRS80-PC TRANSFER

Now you can CROSS the barrier between disk formats! With HYPERCROSS you can FORMAT, DIR, KILL and COPY files to/from over 65 different CP/M and 5 IBM PC disk formats on your own TRS80 under your own DOS! CP/M includes most well known single and double sided formats. PC includes DOS 1.1 and 2.0 and double sided, also Tandy 2000. Automatically corrects for differences in ASCII file formats. Versions available for Model I, III and IV, works well with most DOS's. Needs 48K and 2 drive minimum. Some formats require double sided and or 80 track drives. Model I needs doubler. Specify Model No. and version required. CPM or PC alone \$49.95 Combined deluxe CPM and PC \$79.95 ppd

HYPERSOFT

PO Box 51155, Raleigh, NC 27609
(919) 847-4779

convert a M-100 text file to run on your other computer. You simply press ESC on your other computer, and you are shown the "File Transfer Utility" menu on the other computers monitor. Screen instructions are completely self explanatory.

Disk+ comes to you on diskette and on cassette. You use both to get started with the program, but after that you will only need the diskette. To start with you will load Disk+

from cassette onto your Model 100. Most people will want to leave the Disk+ program in their Model 100 all the time because it frees them from the cassette player from then on. The diskette contains another Disk+ program, used by your other computer. When you copy the diskette, you copy the program also. You first connect your M-100 to your other computer by a cable from the RS232 plugs on each machine. You will need to have a "null

modem" adapter for most computers.

You do not need a monitor. Your Model 100 screen is where the file directories are shown and you do it all by looking at the M-100 screen. If you have a monitor connected to your other computer there are some messages that appear such as "sending a file" or "receiving a file", but you don't need these to work the program.

Memory requirements:

Disk+ itself takes up 4.5K. In order to run the program you must have additionally, 4.5K bytes free.

Here's how easy it is to use:

From the main menu you place the Cursor on Disk+ .BA and press Enter.

Immediately you are shown the RAM directory. This looks just like the main menu except that it doesn't show the resident programs like TEXT or SCHEDL. You can move the wide bar cursor from file to file with the arrow keys. Along the bottom are displayed function key labels that describe what you can do from this directory.

Here is what you can do from the RAM directory...

1. You can move immediately to view the Disk directory.
2. You can save any RAM file to diskette.
3. You can kill any RAM file...you don't have to be connected to another computer to use this feature.
4. You can learn the size in bytes of any RAM file.
5. You can save all files presently in RAM under a single file name (called a sub directory) on the diskette.
6. You can save single files to an already saved sub-directory.
7. You can return to the main menu from the RAM directory.

Function key F1 shows you the Disk directory. This also is arranged just like the main menu. You can move the wide bar cursor from file to file with

Continued on page 52



PLUG 'N' PLAY PRINTER PACKAGES

for Commodore 64, Apple II and IBM include:

Printer, interface, with cable, and paper (20#, 500)

Do you know which printer interface is the best for your computer? The best means the best in price and performance. We at Alpha Scientific are constantly testing and evaluating scientifically many interfaces available on the market to work with a given printer and a computer. We certainly take the guesswork out of the interfacing problems. Worry, no more!

If you are not sure which printer to get, read the Consumer Reports, Oct. 83. Before you buy, add up the total cost of a printer, interface, paper and shipping charges, and compare. You will find our package price is the lowest of all. Besides, we offer you the best interface, a truly plug and print package, and free shipping. Satisfaction guaranteed or your money back.

Computer	Interface	STAR Gemini 10x	STAR Delta 10	Panasonic KX-P1901**	OKIDATA Microline 92	STAR PowerType**
Apple II	Grafstar Dumpling-GX	\$349 ---	\$489 ---	\$419 ---	---	\$439 ---
Commodore 64	CardPrint/4G Tymac Connection	\$359 \$369	\$499 \$509	\$429 \$439	\$519 \$529	\$449 \$459
IBM PC, Kaypro, Osborne with cable		\$319	\$459	\$389	\$479	\$409
Printer Specification:						
Printing speed/ Buffer		120CPS/1K	160CPS/8K	120CPS/1K	160CPS/line	18CPS, 13"
Near letter quality mode/ Graphics		No/ Graftrax	No/ Graftrax	Yes/ Graftrax	Yes/ Okigraph	Daisywheel
Friction/ Tractor/ Adjustable sprocket		Yes/ Yes/ Yes	Yes/ Yes/ Yes	Yes/ Yes/ Yes	Yes/ Yes/ No	Yes/ No/ No
Manufacturer warranty		6 Months	6 Months	1 Year	3 Months	6 Months
Suggested Retail Price (printer alone)		\$399	\$549	\$499	\$599	\$499

** New models. We have tested drive both printer they performed excellently. We were especially impressed by the Panasonic P1901 for its printing quality: correspondence and proportional spacing modes. It is far much better than P1900 model.

ALPHA SCIENTIFIC

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We guarantee and service our products. We carry all brand name diskettes, peripherals, and softwares for all computer systems. Free shipping for the printer package within US continent. COD adds \$6. Visa or Master adds 3%. No resident adds 5.62% tax. Call or write for printing samples & quantity discount. Give name, address, telephone #, and computer system in the order. Best time to call us (Central): Weekdays 4pm-9pm Saturdays 9am-5pm



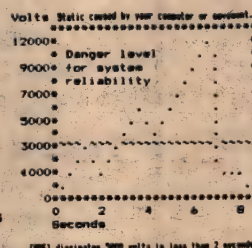
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SOLUTION: The STATIC POTENTIAL EQUALIZER (SPE)

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SOLUTION: With the (SPE) you will be protecting against memory loss, system failures, static interference, untimely crashes, dust build-up on the monitor (thus reducing eye strain) and overall adding years to your computer's life.



TAKE ADVANTAGE OF THIS DIRECT FACTORY OFFER & SAVE!!!

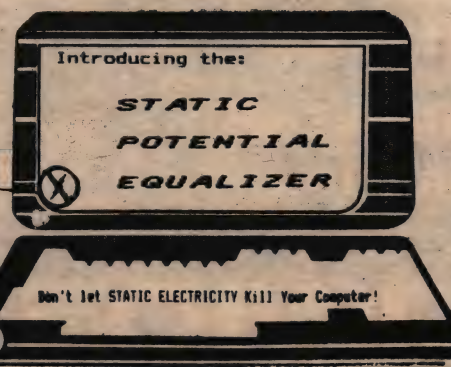
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Denver, CO 80212
(303) 477-8355

The Most Amazing part of the (SPE) is its price!!

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(Quantity Discounts)
(Dealer Inquiries Invited)



FACT: A stroll across the carpet generates ~30,000 volts of Static Electricity.

FACT: During normal operation your computer collects an Electrostatic charge.

FACT: You may not feel 10k volts, but it only takes 2k volts to cause problems.

FACT: Honeywell says, 1232 of the computers are retired because of ESD.

FACT: Static can cause alteration of your computer memory and erroneous data.

FACT: Static can cause program loss, crashes & contamination of display.

FACT: Static Control products now offered don't protect user and computer.

FACT: Now there is a Static Control product that Solves BOTH problems.

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UNIQUE OXIDE COATING — reliably applied and formulated by 3M with over 35 years experience.

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IMPROVED REINFORCED HUB (RH) — Bonded directly to the diskette surface reduces potential problems caused by diskette drive misalignment, thereby saving time and money spent recovering lost information.

3M Diskette Prices

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Single Sided - Single Density - Soft or Hard Sector	
SS - SD Storage Box	\$1.94
SS - SD Bulk with Envelopes No 3M Logo	\$1.69
Single Sided - Double Density - Soft or Hard Sector	
SS - DD Storage Box	\$2.49
Double Sided - Double Density - Soft or 32 Hard Sector	
DS - DD Storage Box	\$2.79

3M 5 1/4" Diskette

Single Sided - Double Density - Soft or Hard Sector	
SS - DD - RH Storage Box	\$1.84
SS - DD - RH Bulk with Envelope No 3M Logo	\$1.65
SS - DD - 96 TPI - RH Storage Box	\$2.49
Double Sided - Double Density - Soft or Hard Sector	
DS - DD - RH Storage Box	\$2.39
DS - DD - RH Bulk with Envelope No 3M Logo	\$1.99
DS - DD - 96 TPI - RH Storage Box	\$3.19
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Shipping & Handling \$3.00/50 Diskettes

Surcharge of 10% for quantities less than 50 Diskettes

Head Cleaning Diskettes

Scotch head cleaning diskettes, used on a regular basis, can eliminate downtime and service call interruption. In less than 30 seconds, particles of dust, dirt and oxide are removed leaving heads clean and more efficient.

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Library Cases

8" Library Case	\$3.00
5 1/4" Library Case	\$2.50

Specify color: Black, Blue, Beige, Gray, Red

Free Shipping with diskette order.



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Unique disk protection in 5 1/4" size. Injection molded files are made of tough, anti-static plastic. Complete with dividers and two keys.

FLIP 'N' FILE 25	\$19.95
FLIP 'N' FILE 50	\$26.95

Flip 'n' File

Keep your flexible disks within easy reach in these convenient units made of attractive and durable acrylic. Two sizes for 5 1/4" and 8" disks — each holds 50 disks. Included are easy-access index dividers. Hinged lid closes tightly and back of case doubles as carrying handle.

5 1/4" Diskettes	\$19.95
8" Diskettes	\$26.95

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DC100A	Per Cartridge (140 ft. 1 mil. - tape)	13.05
DC300A	(300 ft. - 1 mil. 1/4" wide tape)	17.55
DC300XL	20.65	
(An advanced version of the DC300A. 450 ft. of tape, is the same size and interchangeable with the DC300A.)		
DC600HC	25.35	
(Contains 600 ft. of 1/4" tape and is designed and formatted for high capacity drives.)		
DC615HC	18.45	
(Contains 150 ft. of 1/4" tape. Designed and formatted for high capacity drives.)		
DC600A	23.05	
(600 ft. of 1/4" tape. Unformatted tape for use on High Speed Drives.)		

Shipping & Handling \$3.00/5 Data Cartridges

3M Personal Computing Cassettes (Leaderless)



Designed for use with microcomputers, with the name Scotch on the cassette, you get not only the finest computer tape, you get a cassette that provides all the functions and convenience cassette users require

	Per Cassette (Order of 10 or More)
830 - 10 Minute Album	\$1.39 Each
830 - 30 Minute Album	\$1.49 Each

Shipping & Handling \$2.00/5 Cassettes

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Product No.	Length	Price Per Reel*
TAPE SEALS		
777-2400-C55	2400'	\$13.89
777-1200-C55	1200'	\$10.39
777-600-C55	600'	\$ 8.29
SELF-THREADING CARTRIDGES		
777-2400-C143	2400'	\$14.39

(Quantity: 10 Reels/Case) Free Shipping on Computer Tape

Similar savings on 3M Blackwatch Computer Tape! 3M Computer Tape is also available in bulk and canisters in various lengths.

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The soft touch pad that absorbs the static electricity your computer can't



Soft Touch is a pliable 1/8" thick pad of soft vinyl. As an individual pad under terminal keyboards, a simple "touch" procedure will allow static electricity in the body to be harmlessly dissipated to ground.

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TOUCH & GO Stat-Trol mats are available in various sizes.

Size	Price	Size	Price
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24" x 24"	\$28.95 Each	24" x 30"	\$34.25 Each

Shipping & Handling \$2.00 per mat.

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New Disk + Continued from page 50

the arrow keys. If you have saved files from RAM they appear the same as on the main menu. But in addition to the "DO.", "CO.", and "BA" extensions you will have ".SD" extensions. These .SD filenames are created when you do a "Save all" of the files

on any RAM directory menu. Each ".SD" filename represents a subdirectory of up to nineteen separate files.

Here's what you can do from the DISK directory:

1. You can load any single file from diskette to RAM.
2. You can move immediately back to Disk+'s RAM directory.
3. You can load an entire

subdirectory into RAM in one action.

4. You can go into a subdirectory.

From this SUBDIRECTOR you can:

- A. Load a single file from the subdirectory into RAM.
- B. Load the entire subdirectory into RAM.
- C. Kill a file or size a file in the subdirectory.
- D. Save a single file from RAM into the subdirectory you are viewing.
- E. Go directly to the main menu.

From the disk directory (continued)

5. You can kill a single file or an entire subdirectory from the disk directory.
6. You can learn the size of any single file.
7. You can return to the main menu.

Disk+ gives you Model 100 enormous storage capabilities. A typical double-sided diskette allows you to store 300 K bytes or more of programs, text files, and machine code files. Our program means that the M-100 is truly a more functional computer. Full error checking means that you can be assured that programs are ready to run and text files are exactly like you prepared them. This error checking is accomplished by checking each block of data that is transferred. If any character is not correct, that block is retransmitted automatically until it is verified as being correct.

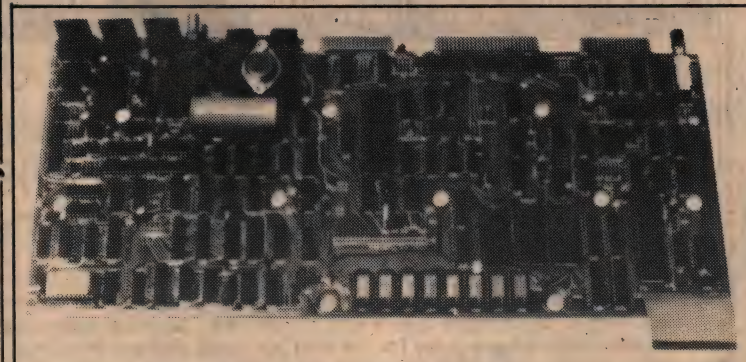
Disk+ is being shipped at \$69.95 including cassette, disk and manual. Cable is \$40.00 extra (or use RS232 w/null modem.)

Disk+ is available through P.C.S.G. offices in Dallas that also provides hotline software support for the Model 100 at (214)351-0564.

For more information write: Portable Computer Support Group, 11035 Harry Hines Blvd., #207, Dallas, TX 75229.

Mention that you read it in Computer Shopper. •

Upgrade Model I To Model III



TRS-80 Model I Upgrade Board.

A new replacement logic board assembly for the Radio Shack Model I is now available for upgrade to Model III performance.

The Northern Information Technology TC-III retains the original keyboard, plastic housing, video monitor and power supply from the Model I while providing full Model III performance.

Features include dual density floppy disk controller, 48K RAM, option on-board RS-232, parallel printer port and dual speed cassette I/O. All known software and accessories for the Model III will run on the TC-III including machine language programs.

All cassette, disk, printer and I/O bus connectors match those on the Model III.

Unique features include reverse video character set, on-board audio driver for speaker, high readability character font and the portability of the original Model I package.

The price for the user installable board, tested and guaranteed for 90 days is \$399.00. The RS-232 option, fully assembled is \$49.00.

For more details write or call Northern Information Technology, Inc., 748 W. Algonquin Rd., Arlington Heights, IL 60005 or call (312)640-3213.

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HOWE SOFTWARE PRODUCT GUIDE

SYSTEM DIAGNOSTIC

Is your computer working correctly? Are you sure? System Diagnostic has complete tests for every component of your TRS-80™ Model 1, 3 or 4.

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The SCRIPSIT™ Compatible Word Processor
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- Assign any sequence of keystrokes to a single control key.
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- Read your old SCRIPSIT™ files.
- Reenter program with all text intact if accidental exit without saving.

"If you like SCRIPSIT, you'll probably love TYPITALL." 80 Micro.

TYPITALL (disk only) \$129.95

TRS-80™ MODEL III ASSEMBLY LANGUAGE

A complete course in assembly language, written for the beginner. Basic concepts, the Z-80 instruction set, complete Model III ROM and RAM information, programming examples, the disk controller, the TRSDOS™ 1.3 disk operating system, RS-232-C interface.

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- Memory buffer holds data.
- Automatic transmission from buffer.
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- Reads Electric Pencil™ & SCRIPSIT™.
- Character translations.
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- Supports cassette and disk systems.

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Model 1/3/4 disk version \$59.95 / Model 1/3/4 cassette version \$29.95
Mod. 2/12/16, IBM/PC or CPM version \$69.95

HOME BUDGET & CHECKBOOK ANALYST

Analyzes your income and expenses, maintains checkbook register, computes monthly and year to date summaries and projections.

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Lotus To Develop 1-2-3 For Tandy 2000

Lotus Development Corporation, announced it is developing a Tandy TRS-80® Model 2000 version of its best selling 1-2-3™ integrated program, to be sold through Radio Shack Computer Centers.

Shipments of 1-2-3 for the Tandy 2000 will begin at mid-year to the more than 1,000 Radio Shack Computer Centers nationwide. Radio Shack is a division of Tandy Corporation.

Lotus is committed to making 1-2-3 available for a wide range of high quality desktop and portable computers such as the Tandy 2000. The addition of Radio Shack Computer Centers to their distribution network will allow them to make 1-2-3 for the Tandy 2000 easily available.

1-2-3, Lotus' initial product, combines spreadsheet analysis, information management, and business graphics into one easy-to-use program. In 1983, the product rapidly established itself as the best-selling business applications program and was named a product of the year by Fortune and InfoWorld magazines.

Introduced in late 1983, the Tandy 2000 is a 16-bit desktop computer that uses the popular MS-DOS operating system. A basic Tandy 2000, priced at \$2,750, includes 128K bytes of random access memory, and two 5 1/4-inch half-height floppy disk drives, with a total storage capacity of 1.4M bytes. The Tandy 2000 is able to run 1-2-3 at a high rate of speed because it uses the advanced Intel® 80186 microprocessor.

The addition of 1-2-3 to Tandy 2000s software library is welcomed by users. Lotus is committed to providing the best business software library for the Tandy 2000.

For more information contact Lotus Development Corp., 161 First Street, Cambridge, MA 02142 or call (617)492-7171.

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New Lazy Writer For Holmes VID-80 Board

The Lazy Writer word processor can now be used with the VID-80 board from Holmes Engineering to display 80 x 24 characters on the screen. The program provides all the same features as the Model IV Lazy Writer with the same display. All Lazy Writer's extension programs will also work. Lazy Writer was the first of the TRS-80 word processors to support the 80 x 24 characters on the Model IV and is now the first with a VID-80 version.

The VID-80 can be installed by a user or dealer. It plugs into existing sockets inside the Model III without modifications, soldering, or trace cuts on the system. In addition to the expanded screen display, the VID-80 may be purchased with CP/M 2.2 giving the computer the ability to read and write many disk formats. With

this operating system, the user has access to CP/M software as well as the TRS-80 software.

Since more words are displayed at once making text on the screen look more like the text that prints, word processing is easier with an 80 x 24 display. This is especially true with material in columns. Both Lazy Writer and the VID-80 are available from dealers or direct from the manufacturers.

For more information write Holmes Engineering, 5175 Green Pine Dr., Salt Lake City, UTAH 84107.

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Percom Portable Disk Drive

Briefcase computers now have the capacity to store information directly onto disk, without using a desktop computer, with the newly developed Percom Portable Disk Drive. It is battery operated, weighs only 3 lbs., has a large storage capacity and can be used with most briefcase computers. The Sony disk drives along with Portable Computer Support Group's programming called Percom Interface, eliminates the need for desk top or main frame computers to transfer information onto disk. This moves personal computer one step closer to becoming a complete office for business people on the move.

The Percom Portable Disk Drive is a Sony 3.5 inch disk drive powered by a 12V rechargeable battery pack and connects to the computers RS232 printer port that is available on most briefcase computers, making it virtually universal in concept. It weighs 3 lbs. and is slightly smaller than a portable cassette recorder (2.00 H x 4.25 w x 8.25 D).

The storage capability of the one sided disk is 500 Kilobytes with a 360,000 formatted capacity. This equals a couple of hundred typed pages, or is about the size of a typical book.

The "PERCOM INTERFACE" operating system, developed by Portable Com-

puter Support Group (P.C.S.G.), is contained in an 8Kbyte ROM in the drive. A specific advantage is its high rate of transfer, the high speed of the drive (almost instantaneous) allows much faster transfer (19200 bits/sec.) than cassette (1200 bits/sec.). This will also include another program, Portable DOS, that will allow Radio Shack's TRS-80 Model 100 to talk to the Percom Drive. Our entire package will be marketed for \$799.00.

Percom Interface is very simple to use. It has been designed to follow the same intuitive simplicity of the Model 100's main menu. To start with you load Portable DOS onto your computer, then you connect your briefcase computer (we will use the Model 100 as our example) to the Percom Portable Disk Drive by a cable from the RS232 plugs on each machine. The Model 100 screen is where the file directories are shown and you do it all by looking at the Model 100 screen.

Memory requirements: Portable DOS itself takes up about 4.1K bytes. In order to run the program you must have an additional 5K or so. Of course, since it provides for you vast memory on the diskettes with virtually instant retrieval, you don't feel the memory consumption.

Here's how easy it is to use:

From the Model 100 main menu you just place the cursor

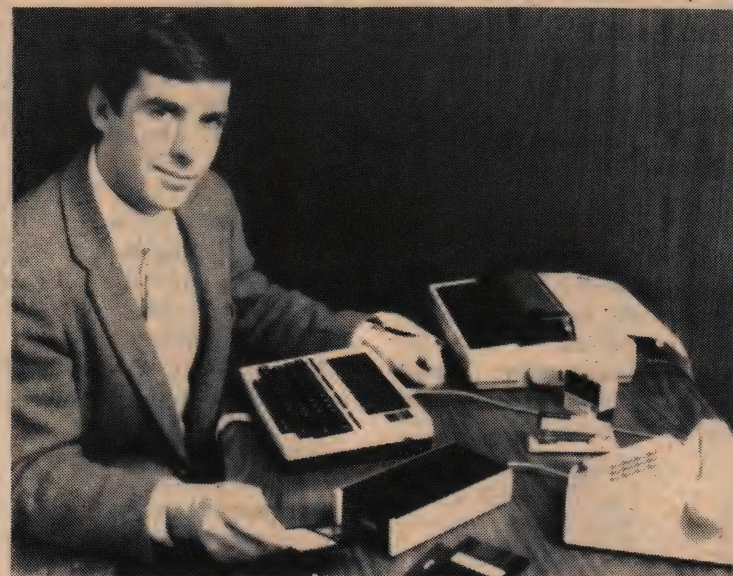
on 'DOS.CO' and press ENTER.

Immediately you are shown RAM directory, called Ram Files. This looks just like the main menu except that it doesn't show the resident programs like TEXT or SCHEDL. You can move the wide bar cursor from file to file with the arrow keys. Along the bottom are displayed function key labels that describe what you can do from the RAM directory.

Here is what you can do from the RAM directory:

- You can move immediately to view the directory.
- You can save any RAM file to diskette.
- You can kill any RAM file.
- You can save all files presently in RAM under a single file name (called a sub directory, ".SD") on the diskette.
- You can save single files to an already saved sub-directory.
- You can return to the main menu anytime.

Function key F1 shows you the disk directory. This also is arranged just like the main menu. You can move the wide bar cursor from file to file with the arrow keys. If you haven't saved any files to your diskette all the directory spaces will be blank. If you have saved files from RAM they appear the same as on the main menu. But in addition to the ".DO",



Percom Portable Disk Drive.

".CO" and ".BA" extensions you will have ".SD" extensions. These ".SD" filenames are created when you do a "Save all" of the files on any RAM directory menu.

Each ".SD" file name represents a subdirectory of up to 19 separate files. This is so convenient if you are working on a particular project, or if different people are using the same Model 100. All your files you had in RAM at a given time can be kept together so you can resume work on that project with the same RAM menu you had earlier.

Here's what you can do from the Model 100 Disk Directory:

- You can load any single file from diskette to RAM.

- You can go back to the RAM directory.
- You can load an entire ".SD" subdirectory into RAM in one action.
- You can go into a ".SD" subdirectory.

From a subdirectory, you can:

- Load a single file from a subdirectory.
- Load the entire subdirectory.
- You can kill any file in the subdirectory.
- You can save a single file from RAM into the subdirectory.
- You can go back to the main menu or the RAM directory.

From the Disk Directory: (continued)

- You can kill a file, or an entire ".SD" subdirectory with all its contents.
- You can size a file.
- You can return to the main menu.

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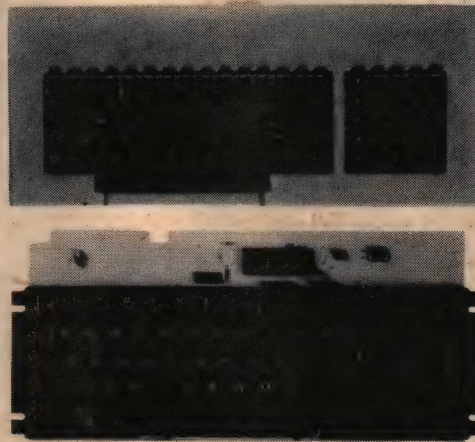
The Percom Portable Disk Drive package includes: The Drive itself, a connecting cable to the computer, an AC adapter/charger, users manual, program diskettes (Percom Interface Utilities) and a program cassette (Portable DOS). An accessory "Y" cable is available for applications requiring simultaneous use of peripherals on the RS232 port. An optional "cigarette lighter" adapter/charger is available.

For more information contact: Portable Computer Support Company, 11035 Harry Hines Blvd., # 207, Dallas, TX 75229, or call 1-214-351-0564.

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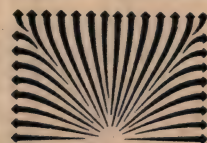


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PORTABLE COMPUTERS

Portable Computers Fly Again

Most of the airlines that last year announced bans on in-flight use of portable computers have by now quietly rescinded their prohibitions on airborne computing, according to the May issue of Portable Computer magazine.

Among the major airlines that banned portable computers, Eastern and United now let passengers use briefcase-size and handheld computers, while American Airlines permits handheld computer use. A briefcase-size computer is a system small enough to fit in a standard attache case, and a handheld computer can be operated with one hand while being held in the other.

While Continental and Western still had bans in effect when contacted, they were conducting the tests that led other airlines to rescind their prohibitions. TWA, Pan Am and Republic are among the airlines that continued to allow passengers to use their computers on aircraft without restrictions.

"The panic is over," writes senior contributing editor Leonard Grzanka, author of the report. "Chicken Little no longer sees airplanes falling from the skies because unsuspecting portable computer users are garbling the aircraft's communications and navigation equipment."

Prohibitions on inflight use

of computers began last August when an aviation advisory board received a report that radio frequency emissions from a passenger's Pac Man game on an Eastern flight caused an engine warning light to come on, forcing the crew to shut down the engine. The Radio Technical Commission for Aeronautics (RTCA) formed an advisory committee to study the problem. Although the advisory committee didn't perceive any danger at the time, several airlines, spurred on by warnings of hazard in computer magazines and by

uncertainty over KAL Flight 007's wandering over Soviet territory, announced that their passengers could no longer use portable computers in the air.

"While RTCA was calling for more information on the problem and further testing, the computer press was publishing accounts that either exaggerated the problem or called for more restrictions," Grzanka writes.

Nevertheless, the magazine notes that portable computers have the potential to become a

problem as aircraft which make extensive use of digital equipment such as the Boeing 757, 767 and Airbus 300 come into wider use. "The closer we get to a fly-by-wire system, the more critical the potential problem becomes," says Rodney Jago, RTCA technical staff officer.

Some airlines still have the bans in effect, and so anyone planning to use a portable computer in flight should call the airline first to check for restrictions. •



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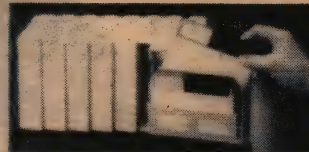
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BOOK is a single entry bookkeeping system for small business, professionals and the self employed based on the system of accounts required for Schedule C of Federal Income Tax Form 1040 to report income, expenses, deductions

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Kaypro Bundles Micro Pro's Software

Kaypro Corporation has announced a major realignment of the software bundled with all Kaypro computer models, reflecting a shift toward MicroPro's WordStar and companion product-line programs which continue to increase in overall popularity among personal computer users. As before, Kaypro will continue to bundle all software without additional cost to the computer purchaser.

The WordStar word processing program is just one of a full line of products offered by MicroPro International Corporation. According to industry figures, WordStar is the industry's most popular word processing program, with well over 800,000 packages sold to date.

According to David Kay, vice-president of marketing and new product development, "We've chosen to move toward MicroPro software for our popular small business computers because of the widespread demand from our customers and dealers. Additionally, we feel that both our dealers and customers can substantially benefit from MicroPro's practice of constantly improving and enhancing their products."

The new bundling arrangements are the result of recent software agreements with MicroPro International Corporation of San Rafael, CA and will affect the Kaypro computer line as follows:

The Kaypro 2, which retails for \$1,295.00, will now be bundled with MicroPro's WordStar, MailMerge, CalcStar, DataStar(tm), and SuperSort, in addition to Word Plus, Profit Plan, M Basic (including 13 games), Multi-Format and CP/M, the operating system.

The Kaypro 4, reintroduced in 1984 with improved on-screen features, real time clock/calendar and built-in modem to retail for \$1,995, will be bundled with MicroPro's WordStar,

MailMerge, CalcStar and InfoStar(tm) (which includes ReportStar(tm) and DataStar), as well as Word Plus -- a spelling correction program, Suprterm -- a telecommunications program that operates with the machine's built-in modem, Microplan, S-Basic, M Basic, C Basic, Multi-Format and CP/M.

The Kaypro 10, the industry's only low cost 10 Megabyte hard disk machine which retails for \$2,795.00; and the Robie, Kaypro's small-footprint desktop computer which will retail for \$2,295.00, will be bundled with the same software as the Kaypro 4.

WordStar, the world's best selling word processing software is designed to be simple to learn for users with no computer experience, yet it contains more powerful capabilities than many stand-alone word processing systems. Features include a wide range of printing and formatting options, such as horizontal scrolling, hyphen help, column move, as well as help menus which automatically adjust to a user's level of proficiency.

MailMerge is a multi-purpose file merging program which helps to produce customized form letters and labels for mass mailings. It can also be used to assemble documents from boilerplate paragraphs, or print invoices from DataStar files.

InfoStar is an easy-to-use data base management system (DBMS) that doesn't require the user to learn a programming language. Four levels of help menus, in simple English guide the user through each step of data entry form design and detailed report generation. In about 60 seconds, the user can generate a pre-formatted "quick report" by simply selecting the data desired.

InfoStar's transaction pro-

Continued on page 58

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Perimeter Project Planning and			
Management Software	\$695	\$559	\$559
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Financier II	\$195	\$147	\$147
Financier Tax	\$175	\$127	\$127
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cessing and updating capability enables the user to update his records easily across file boundaries, insuring the completeness and accuracy of his records at all times. For data entry, a cursor is used to "draw" forms on the screen, instead of expending time with commands and calculating coordinates. InfoStar provides full report writing capability with its custom report feature. The program provides up to

nine control breaks, arithmetic calculations within the report, and allows the user to incorporate data from multiple files. Print enhancement features include bold facing and underlining. Sorting is also faster as InfoStar sorts at the rate of 1367 records per minute.

DataStar allows the user to enter, update and retrieve virtually any kind of information commonly used in business. DataStar's flexibility allows the user to create numerous tailor made applications -- from

customer record systems and company telephone directories to inventory systems and real estate listings. DataStar can combine with SuperSort for additional capabilities.

CalcStar is an electronic spreadsheet offering a wide range of functions including calculations, projection, and regression. This program enables the operator to explore various "what if" assumptions and automatically see the impact of these on a large set of interrelated calculations. It also has an Automatic Form Mode, a prompting system that helps the new operator enter complex data. Completed spreadsheets can be merged into financial reports created with WordStar.

SuperSort, available with the kaypro 2, combines speed and flexibility in sorting, merging and selecting information from data files. SuperSort permits the user to sort and merge up to 32 files into a single file at a rate of at least 1367 records per minute -- still the fastest sort utility available for microcomputers. The program accepts data in many different formats; it can be justified, include floating decimals, exponential notation, upper and lower case letters, and can even be in several different standard formats, including binary, BCD, ASCII and others.

MicroPro International Corporation is a leading supplier of microcomputer applications software. Headquartered in San Rafael, CA, MicroPro has 21 field sales offices in North America and seven international subsidiaries in Europe and Japan. MicroPro software has been translated into nine languages.

Kaypro Corporation is a leading manufacturer of personal and business computers, including the Kaypro 2, Kaypro 4, and Kaypro 10, as well as Plus 88 versions of the Kaypro 2 and Kaypro 4 which permit operation with either the 8 bit CP/M operating system or the 16 bit MS-DOS operating system. Kaypro's shares are traded over the counter under the NASDAQ symbol, KPRO.

For further information about the Kaypro line of personal and business microcomputers, write to Kaypro Corporation, 533 Stevens Ave., Solana Beach, CA 92075.

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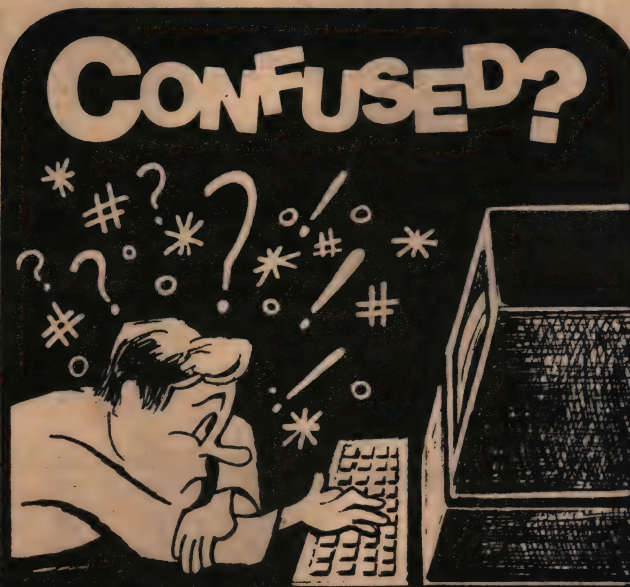
The ALEX 500A is designed for maximum user utility by offering more features and bet-

ter performance in a compact, easily handled package. These characteristics have found wide acceptance including the NASA of photographing Halley's Comet.

Weighing only 18 lbs. and measuring 15" x 14" x 5" the ALEX 500A is one of the smallest portables with full display monitor. For use in vehicles a power converter is optional. The price for the ALEX 500A is \$2495.00.

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Hewlett-Packard Introduces The Nine Pound MSDOS Portable

A nine-pound, notebook-sized computer introduced by Hewlett-Packard Company offers the power and capabilities of a desktop computer in a truly portable package.

Called The Portable, the new computer features a flip-up, 16-line by 80-column liquid-crystal display, a full-size keyboard and built-in software (including the best-selling 1-2-3™ from Lotus™). It contains almost 3/4 of a megabyte of memory and can run industry-standard MS-DOS software and share data with HP, IBM and other personal computers.

The Portable is an advanced, 16-bit personal computer that is small and light enough to take anywhere.

Measuring 13 by 10 by 3 inches, The Portable runs on rechargeable batteries for one to two weeks of normal use. This portability, coupled with its powers, adds up to a liberating alternative to desktop computing.

The new machine may be used as a stand-alone computer, with part of its large, continuous memory acting as a disc drive; as a remote terminal with its built-in modem; or as a data-sharing companion to an HP, IBM or other desktop computer. It also functions as the central element in a complete portable computing system, with battery-powered 3 1/2-inch disc drive — also announced — and HP's recently introduced ThinkJet printer.

The Portable is U.S. list priced at \$2,995 and will be available June 15 from authorized HP personal-computer dealers and from HP.

Built-in Software

HP estimates that 80% of the uses of personal computers are covered by programs built into The Portable's 384 kilobytes of read-only memory (ROM).

This software on a chip includes:

- Personal Applications Manager, a friendly operating environment first introduced on the HP 150 touchscreen personal computer — it shields the user from having to learn the MS-DOS operating system to use The Portable;
- MemoMaker, a simple word-processing program that also runs on the HP 150;
- 1-2-3 from Lotus, which

combines spreadsheets, graphics and file management in an integrated package; and

- terminal emulation for communicating with other computers.

HP said ROM-based software allows for a new kind of computing in which programs and data are always present, wherever The Portable is carried.

Because they reside in ROM, these packages are executed much faster than disc-based software.

All the memory is continuous, meaning programs and data are always saved, even when the display is off. Therefore, users can load several additional programs into RAM, then create spreadsheets, memos and other work while traveling without a disc drive.

Portable, Battery-powered Peripherals

The versatility of The Portable is increased, by the new HP 9114A disc drive and the ThinkJet personal printer from HP (introduced last March).

These peripherals can stay on a user's desk, providing a home station for loading programs, printing and storing completed work on disc. Or, because they are small, light and run on batteries, the disc drive and ThinkJet printer can be taken along with The Portable, using an optional system carrying case.

The HP 9114A disc drive is the first 3 1/2-inch drive with the ability to read from and write on both sides of a 3 1/2-inch disc. Each disc, therefore, can hold 710 kilobytes of information. In normal use, the disc drive will operate for eight hours before its batteries need recharging.

Measuring 8 by 11 1/2 by 3 inches and weighing five pounds, the HP 9114A is priced at \$795 and will be available with The Portable on June 15 from authorized HP personal-computer dealers and from HP.

The ThinkJet printer is the personal printer from Hewlett-Packard that combines high-quality, quiet printing with a U.S. list price of \$495. The ThinkJet printer has the same dimensions as the disc drive, weighs 5 1/2 pounds and is available now.

Portable-Desktop Link

The Portable can share data with other computers via The Portable-Desktop Link (PDL)

package, which includes an HP-IL card and software, available for the HP 150 and IBM PC (and compatible) computers.

For example, a user working through PDL could load a spreadsheet (1-2-3 from Lotus) from an HP 150 into The Portable, take it home for the night, and the next day load the revised spreadsheet from The Portable back into the desktop system.

The PDL for communicating with the HP 150 is priced at \$150 and includes an interface card with both HP-IL and a Centronix-type printer interface and software. The PDL for the IBM PC (and compatible computers) is priced at \$125 and includes an HP-IL interface card and software. Both will be available June 15.

In addition, The Portable's built-in modem allows access to public databanks and other computers. Its built-in serial RS-232C interface can be used to hardwire The Portable to other computers or to connect to higher-speed, external modems or other RS-232C-based peripherals such as letter-quality printers.

Runs Industry-standard Software

Many of the most popular MS-DOS personal-computer programs will be available for The Portable on July 1 with many more to follow, HP said.

Users therefore can run their favorite software on The Portable, loading programs via the HP 9114 disc drive, or from their HP 150, IBM PC or other compatible desktop computer connected to The Portable via the optional PDL.



HP Portable, ThinkJet Printer and HP 9114 Disk.

16-line LCD Display

The Portable features an 80-column by 16-line liquid-crystal display, as big as any available today on portable computers. The display also supports graphics at no extra charge and has resolution of 480x128 pixels.

Electronic-disc RAM

The Portable's 272 kilobytes of RAM are partitionable by the user into electronic-disc memory and user memory. This allows programs stored in "E-disc RAM" to be accessed at speeds much faster than traditional disc-based software. This feature reduces the need to take a disc drive when away from the office.

The Portable comes with a

battery recharger, an AC adapter and a carrying case. Additionally, manuals are provided for all of the built-in software including 1-2-3 from Lotus.

Optional accessories, in addition to a full-time carrying case, are leather carrying case and acoustic cups for using the built-in modem on non-modular jack telephones found in most hotel rooms.

For information call local authorized Hewlett-Packard personal-computer dealer, HP sales office or (800) FOR-HPPC., or write: Inquiries Manager, Hewlett-Packard Co., 1000 NE Circle Blvd., Corvallis, OR 97330.

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PRIORITIES — another affordable program from Overbeek Enterprises.

Introducing The Bullet From Holmes Engineering

"The Bullet" a portable micro drive from Holmes Engineering for your TRS-80 Model 100, NEC 8201, and Olivetti M-10.

Your lap computer is a revolutionary tool which allows you to take computer power with you wherever you go. However, you have probably discovered that your computer does not store enough text and program files for your needs, so you are looking for some way to increase storage capacity. At the present time, there are three ways to do this:

Cassette Recorder

Your computer has a built-in ability to use an audio cassette recorder to store text and program files. Though this is economical, it tends to be very frustrating. You spend a

great deal of time searching through tapes looking for files, finding the beginning of files, adjusting the recorder's volume and tone controls, and re-trying saves and loads until (you hope) you get a good save or load of your file. The reason you bought your computer in the first place is to save time and increase efficiency. The audio cassette as a "mass storage" device is very time-consuming and inefficient.

"Floppy Disk"

Speed is no problem here, nor is storage capacity. The available systems are great to use, if you only use your lap computer in one place! Since your computer is a portable, you are severely limited by the lack of portability of a full-sized disk system. In addition, floppy disk systems may cost more than you paid for your computer in the first place!

The Bullet is an excellent solution to your mass storage needs. It stores text and programs on small plastic tape cartridges (called "wafers" because they are so small and thin), about the size of a business card and 3/16" thick. The Bullet is a little more than half the size of your computer. Your computer and The Bullet together weigh only about 7 pounds and easily fit into a briefcase for complete portability. The Bullet has a built-in rechargeable, high capacity battery, which will power both The Bullet and the computer for hours! Additional features of The Bullet are:

Easy To Use--

The Bullet package comes with a coiled cord (just like the one on your telephone) which plugs into the connector at the rear of your computer. Just

plug the two units together, type in a single BASIC command, and you are ready to use the simple, menu-driven Bullet system. Using The Bullet is as simple and easy as using your computer. You select the operation you wish to perform using the computer function keys, and select the files you wish to save or load using the cursor keys, just as you do now. There are no abstract, difficult commands for you to struggle with.

Efficient--

A floppy disk system can use up to 15% of the total memory available in your computer! The Bullet, by contrast, uses less than 5%, leaving more valuable memory space for you to use for programs, letters, etc. The importance of memory space in these computers cannot be over-emphasized! A disk system would use up enough memory to store an entire page of text (about 4K), while The Bullet uses only a couple of paragraphs worth of memory (about 1K).

Quick And Convenient--

The Bullet can list all the files on a wafer by name on your computer's screen in about 30 seconds. The same operation on a cassette recorder could take up to ten minutes. (The Bullet is faster than the PMD-100, the earlier product from Holmes.) It is easy to forget what is on a tape; The Bullet will find your files quickly and easily without the need to keep track of what's on a wafer. Saving and loading files is quick and easy thanks to simple, menu driven commands.

Economical--

At about 1/2 the cost of

available floppy disk systems. The Bullet is the most cost-effective, efficient mass storage system for your computer. The \$349.95 price includes: The Bullet, user's manual, battery charger, connecting cables and wafer tape. Additional wafer tapes are available from Holmes Engineering.

Specifications:

Size: 8" wide by 5 1/2" deep by 2 1/2" high.

Weight: Approximately 3.75 pounds.

Hardware: Z-80A CPU, 16K RAM, 4K ROM, high efficiency power supply.

Software: 4K ROM based operation system for The Scribe.

Interface: RS-232 operating at 9600 baud.

Power Source: 12 volt 1.8 amp-hour gel-cell (110 VAC50/60 HZ. with AC power pack, included).

Storage Media: Continuous loop "wafer tape", size approximately 2-5/8" x 1-9/16" x

3/16". Contains continuous loop of 1/8" magnetic recording tape.

Wafer tapes are available with the following capacities: Media Capacity:

Wafer Length	Storage capacity (K = 1000 bytes)
10'	12 K
20'	24 K
35'	42 K
50'	64 K

The Bullet and all accessories are warranted to be free from manufacturing defects for a period of ninety days from date of purchase. The wafer tapes are warranted to be free from defects for a period of 30 days from the date of purchase.

For more information write or call Holmes Engineering, 5175 GreenPine Drive, Salt Lake City, UT 84107 or call (801)261-5652.

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Panasonic's New "Super" Sr. Partner Computer Features Hard Disk

The Panasonic Industrial Company has added a hard disk portable personal computer—the "super" Sr. Partner to the line (featured last month in Computer Shopper), which utilizes the MS-DOS 2.11 operating system and can run IBM-compatible software and hardware. It also features a built-in thermal printer, a double-sided, double-density disk drive, 128K RAM, and a 9-inch CRT packaged in a metal cabinet with a carrying handle.

The "super" Sr. Partner, with a Winchester-type 5 1/4-inch hard disk and 10 megabyte drive will have a suggested retail price of under \$5000 when it becomes available in late September.

The "super" Sr. Partner utilizes a 16-bit 8088 microprocessor with an 8087 co-processor socket. The MS-DOS 2.11 operating system accepts virtually all software which can be run on the IBM personal computer without modification. The keyboard is ergonomically designed and accepts IBM overlays. The standard 128K RAM is expandable to 512K. The unit comes with a 5 1/4-inch hard disk drive which stores 10 megabytes of data.

The built-in thermal printer is a feature found on few other

personal computers. With graphics capability, it's fast, quiet, and very convenient. It can be switched from 80 characters per line to 132 characters per line, making it ideal for spreadsheet work. Designed for easy reading, the printer is situated on top of the unit so it can be glanced at easily by the user.

Ergonomics were a major concern in the design of the 9-inch CRT as well. Positioned directly in front, it has a brightness control and a soft green background for easy viewing. It displays a full 80 characters on each of its 25 lines, which is one line deeper than most other computer displays. The display can be switched from 80 to 40 characters per line.

The keyboard, CRT, and printer are a single unit encased in a double reinforced metal case. It measures only 18 1/4"(W) x 13-3/16"(D) x 8 1/4"(H) so it can easily fit on a desk or under an airline seat.

For information write Panasonic, One Panasonic Way, Secaucus, New Jersey 07094 or call 201-348-7183 (Ron Tomczyk), 201-392-4322 (Rich Henning), or 212-418-3093 (John Lissner).

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*The Printer Painter is meant to be used with a Microline printer with an Okidigraph I graphics chip.

This is for use on the MAX-80 and the TRS-80 models I and III. It requires two drives and 64K (or one drive DD or DS) with printer. Please describe your system with order."

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Turbo Pascal — A Great Language For A Great Price

by Stan Veit

I am an admitted Pascalophile. I was an early user of the language, a charter member of USEUS (UCSD Pascal Users Group) and I taught Pascal on Apples and IBM PC's, at the New School for Social Research in New York City. For a while I worked for a company that built computers based upon the Western Digital Pascal Microengine. I have used almost all the versions of the language from the Tiny Pascal for the TRS-80 Model I to Pascal on mainframes. I have met many versions that I did not like. I am not considered timid about saying, what it is that I do not like.

All this is prelude to a rave review of Turbo Pascal from Borland International. Please bear with me for a bit longer. I must tell you a story.

At the West Coast Computer Faire in San Francisco I was watching our stuff while the other members of our staff unloaded our station wagon. (No one was allowed to drive down the ramp to unload, they blamed it on the Unions!) Well, I saw these guys

unloading a huge truckload of small boxes and moving them down the ramp into Brooks Hall. "What is in the boxes?" I asked, being a nosey Editor. "Pascal" said he, "Turbo Pascal". "That's the biggest load of Pascal I ever saw", said I. "What in the world are you going to DO with it?" We are going to sell it, CHEAP." "How cheap", said I. "\$46, that's how cheap, it's a show special." "How much does it sell for when it's not on special?" "It's regularly priced at \$49.95, including the Editor!" "My God another JRT Pascal." I must have thought out loud because he answered me. "Not so, this is GOOD Pascal, besides we deliver what we sell, see here it is." When the show was set up, I went over to their booth and introduced myself and asked for a review copy. Philippe Kahn, the President of Borland International, gave it to me and wished me good luck. I promised him a review: and here it is.

Turbo Pascal From Borland International
4113 Scotts Valley Drive
Scotts Valley, CA 95066
Phone: 438-8400

Price: \$49.95 including 250 Page Manual

To start with the 250 page Reference Manual that comes with Turbo Pascal is readable, and easy to use. It is NOT a course in Pascal. There is enough of those in book stores, if you need one. It is an intelligent Reference Manual. To anyone who waded through the early UCSD Manuals this is a blessing.

The language itself is very close to "Standard Pascal" specified in the Pascal User Manual and Report by Jensen and Wirth. The exceptions are few and include such things as the GOTO statement may not leave the current block. Procedures and Functions may not be passed as parameters, the procedure PAGE is not implemented as the operating system does not define the form feed character. The reserved word PACKED has no effect in Turbo Pascal, because packing occurs automatically. GET and PUT are not implemented. Instead the READ and WRITE procedures have been extended to handle the I/O.

Dynamic variables use the standard procedures NEW, MARK, and RELEASE instead of NEW and DISPOSE.

These are the same type of deviations made in many other versions. You can live with them. You also get 11 significant digits for floating point (Real). Program chaining with common variables. Random access data files and much more.

The Editor is written so that it is very close to WordStar. Anyone who has ever used that popular word processor will be able to sit down and use the Editor. The few exceptions are printed on one page. If you

don't know WordStar the Turbo Manual will teach you enough to use the Editor. Turbo Pascal supports the usual types (INTEGER, REAL, CHAR, BOOLEAN) including Strings, Arrays, Records, Sets and Files (including Text Files). It also supports a type called BYTE which is a scalar subrange of the type INTEGER (of the range 0..255). There are enough bells and whistles in the language to satisfy the requirements of any program I can think of writing and I am sure that you will feel

Continued on page 62

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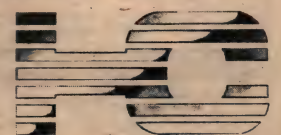
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Turbo Pascal Continued from page 61

the same way about it. One of them is TYPED CONSTANTS which can be used exactly like a variable of the same type. This means that TYPED CONSTANTS may be used as "Initialized Variables" because the value of the typed constant is defined, while the value of a variable is undefined until assignment is made. Neat.

Another nice feature is that transcendental functions are built-in as standard functions. No "Include" is necessary.

Turbo Pascal, because it is designed to run under CP/M or MSDOS, it treats external devices such as printers, modems, terminals as logical devices, which are treated as text files. These are CON-Console Device, TRM-

Terminal Device, KBD-keyboard, LST -the List Device (printer), AUX- auxiliary device and USR -The User Device. Programmers experienced with CP/M will have no trouble with these concepts, although they may be strange to pure UCSD users. The Manual will direct users of CP/M-80, CP/M-86 and MSDOS to the difference in implementation which turns out to be minor.

While we have not run the comparative Benchmarks published by Borland International who compared Turbo Pascal with IBM Pascal and Pascal MT. This consisted of the Eight Queens Problem by Niklaus Wirth from his book Algorithms + Data Structures = Programs. The Compile and Link speeds for Turbo Pascal were 1 second vs

97, and 90 seconds respectively. The execution speed was 2.2 seconds vs 9 seconds and 3 seconds. From the tests I ran on my program, I do not question these results. It is fast!

All the published tests and my tests were done on a IBM PC. Turbo Pascal is a one-pass, native-code compiler that generates object code. It claims to locate run time errors directly in source code.

I tested Version 1.0 which is good enough for me, but now Version 2.0 is out and the price is the same. In fact they will update up 1.0 users for only \$29.95! (Just like Softech, Ha!) What wonders do we have in 2.0? Windows, that's what! (I get frightened when people promise me Windows. I have been fooled so many times by press releases for Windows, that I don't even believe Andersen Window Co. ads!) Borland also promises Automatic Overlays, Graphics, Sound and Color for the IBM PC or IBM jr, yet. Not to mention optional 8087 Support for only \$89.95. You buy the chip, they make it work for less than a C-note!

This is the biggest bargain in computer languages since SWTPC sold 8K BASIC for \$12!

Even if you hate Pascal, try it, you'll like it. •

MAG/base, Release 4.0 Now Shipping In MS-DOS, PC-DOS

MAG Software is now shipping its newest version of MAG/base² and MAG/base³, Release 4.0, in PC-DOS and MS-DOS. This release extends the relational capabilities of the two database management systems by letting them manipulate data logically and arithmetically from up to five files simultaneously to update existing files, create new target files and write reports and special forms.

This enhanced relational capability utilizes MAG's Dynamic Join which is as high as 20 times faster than the more commonly used physical join. Dynamic Join reads only the records that meet the desired criteria while a physical join reads all the records repetitively to make its selections.

A third enhancement lets the user write reports to disk as well as screen and printer.

This release, announced at COMDEX last November, includes multi-user capabilities. According to Greg Scott, MAG president, the multi-user version was shipped the end of March. This version lets any number of users read and up-

date a database simultaneously by locking the record for update for a half second or so and then releasing it in its new form back into the database. During the fraction of a second while the record is frozen it can still be read in its original form by other users. Unlike the extended relational functions which are available only to MAG/base² and MAG/base³, multi-user capability will be available to all three MAG/base products, MAG/base², MAG/base³ and MAG/base³. These three DBMS products let the user upgrade to more DBMS sophistication within the MAG/base family without rekeying files or paying a price penalty.

MAG/base is sold through dealers in the U.S. and abroad. Its retail prices are \$295, \$495 and \$795. Updates for current MAG users cost \$125 and are available with proof of purchase from MAG Software.

For more information, write MAG Software, Inc., 21025 Sherman Way, Suite 305, Canoga Park, CA 91303 or call 818-883-DBMS.

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THE DESK ORGANIZER'S unstructured electronic notepad has countless applications. The perfect tool to help you manage the flow of information across your desk.

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For personal use, **THE DESK ORGANIZER** helps you remember birthdays, anniversaries, appointments, maintenance needs, social events, household inventory, expenses, investments, recipes, names and addresses, telephone numbers—anything!

FILING SYSTEM

Label your notes. Then file them in **THE DESK ORGANIZER'S** sophisticated filing system. Labels are automatically indexed in alphabetical order.

If you like, create separate indexes for correspondence, telephone numbers, check lists, or any category important to you.

Indexes are a snap to page through. Information retrieval performed in seconds.

TIME TOOLS

Clock... calendar... alarm. **THE DESK ORGANIZER** recognizes that much of your work and information flow is time-sensitive. Digital clock and monthly calendar displays interact with appointment schedule.

An alarm system (chimes, graphics, or both) makes sure you don't miss your appointment. Your appointment notes automatically appear on the screen.

You can page through the calendar a day, a week, or a month at a time. Or you can 'jump' to a desired day.

What appointments do you have next Wednesday? **THE DESK ORGANIZER** tells you in seconds. Don't want to forget your anniversary? You can't with **THE DESK ORGANIZER** working for you.

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Notes retrieved from the electronic filing system may be printed in seconds. Codes built into **THE DESK ORGANIZER** even control your printer's special features, such as enlarged print style.

VERSATILE CALCULATOR

An easy-to-use programmable calculator performs the simplest functions. Yet it is sophisticated enough to handle advanced calculations. "Anyone for algebraic formulas, exponential equations, trigonometry? How about settings in either degrees or radians?"

Incorrect formulas don't slip by **THE DESK ORGANIZER**. It lets you know when a formula has a bug in it.

Some useful formulas are provided on the tutorial disk—monthly payment calculations, future value of investments, depreciation schedules.

ELECTRONIC STAMPS

THE DESK ORGANIZER'S has special stamp capabilities that make rubber stamps and ink pads obsolete. Notes can be date stamped or imprinted with your own time-saving notations.

TELEPHONE DIRECTORY/DIALER

Create a separate index for telephone numbers. Thousands of telephone numbers can be stored on a single disk.

Using your modem and communications card, **THE DESK ORGANIZER** dials numbers automatically. It doesn't forget a number. Or dial a wrong number.

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THE DESK ORGANIZER adapts to the way you work. It takes your idiosyncracies in stride. You are in control. Some of **THE DESK ORGANIZER'S** features can be

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THE DESK ORGANIZER knows when to step aside. You can run best selling software simultaneously. Lotus 1-2-3, WordStar, Visicalc, Dbase II, and many, many others.

It will still let you know when it is time for an appointment, even when other software is running. **THE DESK ORGANIZER** is only a keystroke away.


BEST SOFTWARE DEAL


It's hard to believe that these time and information management tools can be so deftly integrated into one superb software package. That one computer program can do so much to replace a messy desk.


Guaranteed to improve your work habits and productivity. Cuts down on work load frustration. Get a better handle on time wasters.


At only \$249.00, **THE DESK ORGANIZER** has an incredibly short payback period. Yet benefits accrue everyday.

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
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
Just about the most useful thing to come around for the manager since 1-2-3." 

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"The Desk Organizer, does just about everything except play 'For He's A Jolly Good Fellow' at the end of a rough day." 

"A superb software package."

"So easy to use that its manual might be considered overkill." 

"I can recommend this package without hesitation." 

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HS/FORTH includes utility files to read, write and load standard MS-DOS files, standard screens, and screens mapped onto random access files. Other utilities include segment management, graphics, decimal floating point, and sound effects and music. The source code for the background music package provides an example of multitasking. Interrupt handling benefits from HS/FORTH's ability to execute high level Forth words from within machine code routines.

The assembler, which implements the complete 8088/8086 instruction set, can create new code primitives or

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The widely quoted "Sieve of Eratosthenes" benchmark (BYTE January 1983) requires 70 to 140 seconds execution time on various FORTHS, most of which are limited to 64K programs. HS/FORTH requires only 47 seconds, and with AUTO-OPT, a mere 9 seconds. The MICRO-ASM extension brings this time to 5 seconds. Compare with 5 seconds for optimized machine code and 2000 seconds for interpreted BASIC.

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PC Speak™, Talking Software For Blind IBM PC Users

Solutions By Example, Inc., a developer and publisher of business software, has announced a new and improved version of PC Speak™, its highly successful software package that makes it possible for the visually handicapped to access virtually all software available for the IBM Personal Computer.

This newest and most advanced version, PC Speak 2.0, was announced by Max S. Rosenblatt, president of Solutions By Example, Inc. (SBE).

"This product was created in the most professional of programming environments," explained Rosenblatt, "and it includes substantial input from blind data processing professionals. From the time we first introduced PC Speak in the fall of last year, we have had terrific product acceptance and this has led to suggestions for improvement. We have included them in this new edition.

"With these improvements, we feel we have produced what we believe to be the state-of-the-art product in talking software, a product that should really open up significant new opportunities for visually-impaired users of the IBM PC."

PC Speak works this way:

The software operates in conjunction with a text-to-speech synthesizer and both substitute for the visual display in the IBM PC hardware package.

PC Speak can actually say what is sent to the display, or can be used to review the display much the same way as

when a sighted person scans a screen. The visually-impaired user can select words or lines with the cursor control keys to be spelled or pronounced.

Users can also supply different pronunciations for punctuation marks and other symbols to be used in special environments. For example, in a spreadsheet, a decimal point might be pronounced "point," while in a word processing environment it could be pronounced "period."

"This product makes it possible for a blind person to use the PC just like anybody else," said Rosenblatt. "And it doesn't cost any more, either. Rather than buying a monitor, he buys PC Speak and a text-to-speech synthesizer. In addition, this same combination with a modem and terminal emulation software can provide a cost-effective timesharing terminal for a blind person."

PC Speak 2.0 works in a minimum configuration of 64K, a single disk drive,

parallel or serial adapter, PC DOS 1.1 or 2.0 and a text-to-speech synthesizer such as a Votrax Type-N-Talk™.

PC Speak can also be used with programming languages such as BASIC and Pascal, spreadsheets such as 1-2-3™ and VisiCalc™, and numerous other products.

PC Speak 2.0 is now available for \$395 from Solutions By Example, Inc., Box 307, New Town Branch, Boston, MA 02258, or by calling 617-244-5880.

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Multi Function Card For IBM-PC

AST Research, Inc. of Irvine, California is introducing MonoGraphPlus™, its new high-resolution graphics board, here at the Interface

Show in Las Vegas. Designed for the IBM PC and XT computers, MonoGraphPlus™ adds high resolution and bit-mapped graphics capabilities

to the IBM monochrome display terminal. "The AST MonoGraphPlus is to integrated hardware as Lotus 1-2-3™ is to integrated software," according to Ciro Cornejo, design engineer.

This user-installable enhancement is compatible with Lotus 1-2-3 and other popular programs. It lets IBM PC/XT users take full use of the graphic attributes of the software...plus provides flicker-free display...using the IBM black and white screen.

The MonoGraphPlus has an IBM compatible parallel printer port and IBM PC-DOS compatible clock calendar with battery backup. The AST SuperPak™ Software (which includes ASTCLOCK™, SuperDrive™, and SuperSpool™) is also included in the package price.

Optional is an IBM compatible asynchronous serial port. The minimum configuration for installation of the MonoGraphPlus is an IBM PC or XT with one floppy disk drive, 64KB of memory, and an IBM monochrome display

unit. Also, the MonoGraphPlus kit comes with all interfaces and extensive documentation for installation and operation, including AST's full one-year warranty.

AST Research, Inc. of Irvine, California is the leading supplier of IBM PC/XT and IBM compatible add-on products for offices and businesses in the world. Products include mainframe communications, multifunction cards, enhancement accessories for microcomputers, and its newest products, AST-PCnet II™ local area network system and the MonoGraphPlus. AST products, which are designed, manufactured, and supported by AST Research, Inc., are distributed worldwide through an extensive network of over 800 distributors, dealers and retail stores.

Contact: Shari Pierce,
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C View Manager

Blaise Computing has announced a new product in its line of C language programmer's aids, C VIEW MANAGER and new versions of its two function libraries, C TOOLS and C TOOLS 2. C VIEW MANAGER brings

much of the functionality of a mainframe screen formatting utility to the microcomputer environment. Like the rest of the Blaise C language products, it runs under the MS or PC-DOS operating system in conjunction with any version

of one of three of the foremost C compilers: Microsoft, Lattice, or Computer Innovations. Using C VIEW MANAGER, the system developer is able to quickly design and save output screens using a what-you-paint-is-what-you-get method.

These screens, along with whatever on-line help facilities are required, can then be called back and displayed in the middle of a C program to inform the user or capture information in a readily accessible form. C VIEW MAN-

AGER is available from Blaise at a price of \$275, and source code for its C function library costs an additional \$150.

Blaise has also issued new versions of its well-known C TOOLS and C TOOLS 2 packages. C TOOLS, costing \$125, has advanced string handling capabilities and gives access to IBM-PC hardware features such as screen handling. C TOOLS 2, which costs \$100, harnesses the power of the extra features of DOS 2.0 to implement dynamic memory reallocation, program chaining, software interrupts, and numerous other functions. Registered users will be notified by the company about updates, which are available for a very nominal fee.

Contact: Jay Stewart
415-540-5441. Blaise Computing, Inc., 2034 Blake Street, Berkeley, California 94704.

Mailing List Manager

Mailer, a stand-alone mailing list program for U.S. and Canadian mail, has just been released for the IBM PC. Mailer offers users the features needed for file maintenance and use without requiring set-up, a real savings in time and staff training. The database is already designed as are the formats for printing labels (1, 2 or 3 across) or addressing envelopes. Mailer's fill-in-the-blanks screen form simplifies data entry and update and prevents many common errors. Mailer complements software systems like dBASE II and many word processing programs with mailmerging capabilities such as WordStar/MailMerge, NewWord, Spellbinder and Select. Mailer can "read-in" existing address files, thus saving rekeyboarding, as well as create the word-processable address files needed for merging into letters, creating custom listings, etc. Mailer has extensive sort, scan, search, address file merging, record purging and record selection capabilities. The User's Guide provides a tutorial and includes an index. Mailer runs under IBM PC-DOS as well as CP/M-80 and lists for \$150.

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Contact: Barbara S. Maurizi, Director of Marketing, Maurizi Associates, 1344 Fitch Way, Sacramento, CA 95825. 916-486-2993.

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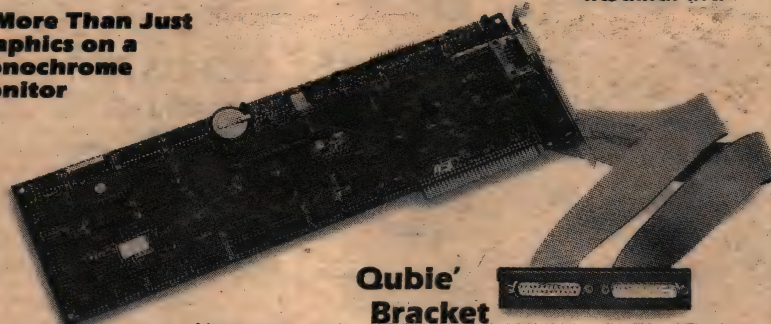
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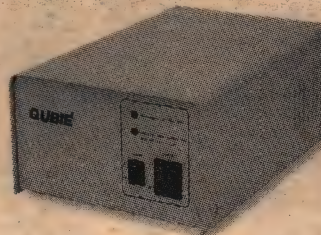
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New Procedure For Registering Your Board

It has come to our attention that many of the BBS listed in the Computer Shopper are inactive. This situation requires corrections by us and by the operators of BBS. Everyone sends in a listing when they START a board but very few people send us notice that their board has become inactive so we can remove their listing. Frankly, we do not have time to keep checking, by calling boards all over the country. Mr. Paul Raymer of Paul's Electric Computer in Las Vegas, NV has suggested a system for avoiding this situation. Like all great ideas it is simple and direct, so we will use it. Mr. Raymer wins an additional year's subscription for the idea.

Starting now - All BBS Listings are good for three months. After that period they will be purged unless we receive a Post Card or Letter saying the board is active. In addition, any reader who contacts a board can confirm that it is active, but it is up to the SYSOP to keep us current.

We thank you for your cooperation. We will keep the listings on a Data Base so please send in your notices every three months.

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Datamate Canoga Park, CA 213-998-7992
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Dial-Your-Match #9 213-345-1047
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Dial-Your-Match #25 213-842-9452
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Software Converts IBM PC To Disk Production Machine

Vertex Systems announces the release of the **Xeno-DISK Production System** for the IBM PC/XT and most compatible computers. Xeno-DISK is an inexpensive solution to the problems of software conversion and distribution among different disk formats. Xeno-DISK will READ, WRITE, FORMAT and DUPLICATE nearly 60 different types of

5¼" double-density disk formats without additional hardware. 80-track formats are also supported with appropriate disk drives.

At moderate production volumes, Xeno-DISK at \$379.50 offers more versatility than other software systems costing 3 to 5 times the price. It even compares favorably with costly dedicated disk

machines because Xeno-DISK easily produces complex master disks from files scattered among different formats. Many dedicated machines can rapidly copy disks, but offer little or no file transfer capabilities.

Xeno-DISK is the only disk mastering and production system running under PC-DOS/MS-DOS. Each of the

modules is fully menu-driven. Disk formats currently supported include most popular CP/M computers plus CP/M-86, TRSDOS 1.3, p-SYSTEM, NECDOS and European formats. Direct disk format parameter input allows use of 40 and 80 track CP/M formats not currently available on the menu. An additional utility, Xeno-Sift, provides ASCII file filtering and processing to aid datafile conversions.

Optional utilities include 80MATE CP/M-80 Emulator

(\$99.50) which simulates a CP/M 2.2 environment under PC-DOS or MS-DOS, and the 80TERM Terminal Emulator (\$44.95). These additional programs accurately simulate a complete CP/M 2.2 environment under MS-DOS, and allow the software developer to run CP/M software before using Xeno-Disk to prepare distribution diskettes.

Vertex Systems, 7950 W. 4th Street, Los Angeles, CA 90048. 213-938-0857.

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ATLAS is entirely menu driven and extremely easy to learn and use.

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location, target marketing, political analysis, market research, advertising studies, governmental resource planning, engineering design projects, plus many more.

ATLAS is designed for use with the IBM PC or XT or 100% compatible; Hewlett Packard 7470 and 7475 plotters or dot matrix graphics printers.

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FUN Tutorial Program

A tutorial programming language for learning the concepts of structured programming and databases. Features include floating point numbers, scientific functions, arrays, graphics, sound, a graphics screen dump, powerful control structures, a modular style, a trace mode, easy but powerful editors, and an error system that explains each mistake thoroughly. FUN is totally interactive, so the user is always in control. In addition, you can create your own statements, functions, and mini-programming languages.

FUN comes complete with seven tutorial manuals explaining how to get started, techniques for useful programs, and many well documented ex-

amples. The error system in FUN prevents you from getting frustrated and allows you to learn from your mistakes.

FUN is designed to help users understand the operations of their computers, so they can use it more effectively. FUN has the same structured style as the popular databases, so users can tailor their application software to work best for their applications. (List Price: \$149.95)

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IBM Graphics For PCjr.

The HyperGraphics Corporation of Dallas announces a new version of their business PRESENTATION GRAPHICS SYSTEM designed for use on the IBM PCjr. The software offers unique capabilities for complete animation, as well as the ability to store up to 1000 color graphics screens per 320kb diskette. This is possible by storing commands, not pixels, so it will not be obsolete when interfaced with higher resolution monitors, as will other "static" graphics packages on the market.

Features of the new business PRESENTATION GRAPHICS SYSTEM include HG PHOTO™, which allows for a graph from another software

package, such as Lotus 1-2-3, to be pulled into HyperGraphics; HYPERPLOT™, which provides easy-to-use, menu-driven business graphs such as pie charts, bar charts, area graphs and 3-D bar charts; window imaging; and function key creation of graphic symbols and bit map animation using a minimum of 3 key strokes.

The product sells for \$195.00 and requires the two-disk drive floppy and 128k of RAM. HyperGraphics Corporation is located at 100 N. Central Expressway, Suite 1208, Richardson, Texas 75080, (214) 690-3000.

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Planner Calc To IBM For PC's, PCjr.

Comshare has licensed a new version of its PlannerCalc spreadsheet product, plus various specialized ready-to-use application spreadsheets, to IBM. IBM will market PlannerCalc for the home, business and professional user. One product, packaged under joint IBM and Comshare logos, will be distributed by IBM for the PCjr, PC, PC/XT and Portable PC products.

"With PlannerCalc and its applications spreadsheets, we've achieved a new level of ease of use in the home market," said Jerome Chessler, Comshare vice-president. "One most often asked question by the owner of a personal computer is: 'What applications can I do with it?' Planner-

Calc's home productivity spreadsheets answer that question.

"The PlannerCalc owner can use any of IBM's family of personal computers to do over two dozen popular home applications without writing a single line of spreadsheet logic," Chessler said.

"That is a breakthrough in ease of use and an affordable solution."

IBM Personal Computer PlannerCalc comes complete with a series of ready-to-use spreadsheets for such applications as home budget, taxes, how to buy a car or home.

Consumers have a total flexibility to modify the applications spreadsheets. Or, they can use PlannerCalc to develop any spreadsheet of their own as large as 512 rows and 128 columns. When they are ready to take these steps, they will discover the ease of use that comes from plain English syntax commands and formulas (for example, Savings = Salary - Expenses).

Through the efforts of Comshare and IBM the software has been designed to take advantage of the features of the IBM PC family of products. Program highlights include:

- On-Screen display of active function keys so the user always knows what keys to use.
- Fast and efficient spreadsheet operation.
- A directory menu so any applications spreadsheet on the diskette is only a pushbutton away when the user inserts PlannerCalc into the machine.

- A menu-driven print capability so the user can select columns and rows for reports.
- Function key set-up of the display screen for use of color. The user can cycle through the color choices for text, background, and highlighting and pick the overall combination more pleasing to the eye.
- Spreadsheet logic all viewed or printed in one automatic step for documentation. This makes it easier to read and understand and even change a spreadsheet, than the cell-by-cell approach taken by other products.

Help screens are throughout the product. Other features include horizontal and vertical split screens for comparing figures physically far apart in the spreadsheet, variable column sizes from two to 30 characters, arithmetic operators and functions, and conditional operators and functions for "what if" calculations.

At \$79.95 IBM Personal Computer PlannerCalc is an affordable introduction into the world of personal computing. PlannerCalc for the IBM PCjr, PC, PC/XT or Portable PC requires 128KB of memory, one dual-sided diskette drive, and DOS Version 2.0 or 2.10. The product can automatically sense and adapt to monochrome or color monitors and can be used in 80 or 40 column format. The 40 column format gives PlannerCalc the flexibility to be used with a standard TV as the display screen.

Comshare, Inc., 3001 South State Street, Ann Arbor, Michigan 48106.

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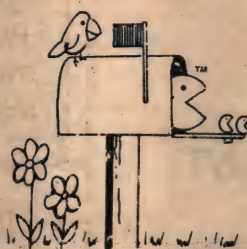
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See page 75 for detailed ad

IBM PC-Compatible Workstation

The M1000, an IBM PC-compatible workstation for the Mentor business computer family, has been announced by Applied Digital Data Systems Inc. (ADDS).

The M1000 workstation is designed for use in conjunction with a host Mentor system and provides Mentor users with the best of two worlds according to Robin T. White, director of sales and marketing for ADDS' Systems Division. "The M1000 offers the proven professional and managerial productivity tools of MS-DOS applications on stand-alone PCs and the ability to use them in the friendly, multi-user environment of the Mentor system.

"And," said White, "the M1000 allows Mentor users to extract specific data from Mentor host data bases in an MS-DOS-compatible format. This data can then be used in an MS-DOS application and the refined data can be returned to the host in a form compatible with the Mentor operating system.

"The M1000 opens the vast world of MS-DOS applications to Mentor users," added White, "including spreadsheets, word processing and graphing, and allows them to integrate those programs under the control of the ADDS-enhanced Pick operating system of the host Mentor."

Primary features of the new M1000 workstation include:

- the ability to retrieve and update individual items in a file or data base;
- the full power of Info/Access for the selection of information from Mentor

host data bases;

- transparency: the M1000 workstation can emulate any standard conventional terminal.

Base price for the ergonomically-designed M1000 workstation for the Mentor is \$2,695 including 128K of RAM (expandable to 768K), one 360K diskette (expandable to two diskettes), a 12-inch monochrome display, keyboard and software.

The MS-DOS-compatible software will be bundled into the price of the M1000 and will also be made available, separately priced, to Mentor users. Initial deliveries of the M1000 workstation to ADDS' international dealer network of systems specialists are under way.

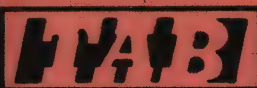
Additional information about the M1000 workstation for the Mentor is available from Robin White, director of marketing and sales, Systems Division, Applied Digital Data Systems Inc., 100 Marcus Boulevard, Hauppauge, NY 11788, or by calling 516-231-5400.

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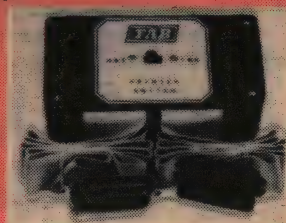
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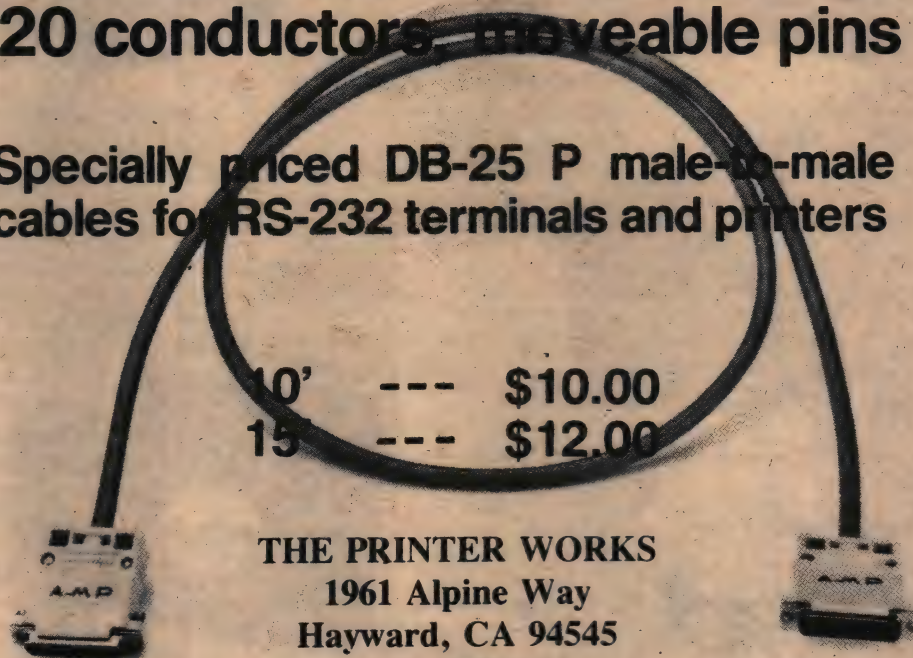
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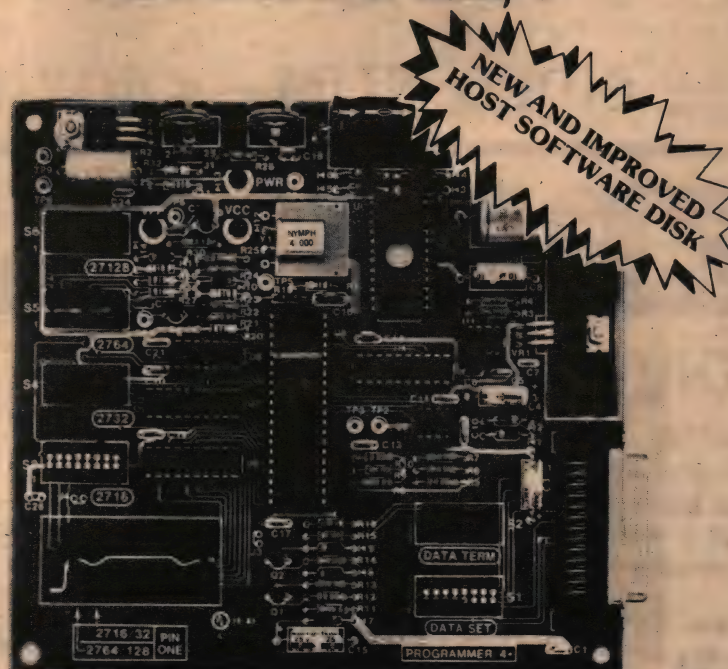
spreadsheet, and business graphics into a single, tightly-integrated program. A unique window management system works in conjunction with all Symphony functions, allowing users to display spreadsheets, documents, forms, graphs, and terminal sessions in convenient layouts both on screen and on paper.

"Symphony from Lotus is the basis for the computer

workstation of the future," said Mitchell Kapor, President of Lotus Development. "The program is so wide ranging, comprehensive, and easy to use that computer users can turn it on in the morning and leave it running all day. We are confident that Symphony will set a new standard for the micro-computer industry."

Continued on page 76

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IMPORTANT 2732 USERS!

Hitachi, Toshiba, and NEC will reportedly stop manufacturing 2732 EPROMs during 1984, to shift their production to 2764's. We confirmed this with three sources.

We have 8Kx8 static RAMs: HITACHI HM6264P-15, HM6264LP-15, and the TOSHIBA TC5565PL-15. These are 28 pin devices compatible with 2764 EPROMs. Both the Hitachi and Toshiba parts are pin compatible. After a brief discussion by phone with both company offices, we are under the strong impression the Toshiba part is slightly better. Both brands have two chip selects, and go into low power mode when only either chip select is disabled. Both Hitachi devices, the P-15 and LP-15, are the very same part, made the same way at the same time, however, the LP device is culled out or tested as being a lower power device. The Toshiba PL-15 and Hitachi LP-15 appear to have identical specs.

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This card requires 64 of the 64K or 256K Dynamic RAM ICs, which is 524,288 bytes or 2,096,912 bytes of RAM respectively. This RAM array is accessed via six I/O ports.

Software is currently available only for CP/M systems, which supports up to four Quasi-Disk boards in one S-100 system.

We offer this board either for outright sale @ \$895. or rental @ \$3. per day, from shipment date until returned, plus any damages incurred. Rental payment is only allowed for 30 days, or buy the board w/o RAM @ \$500.

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We stock only factory new, prime ICS. If any competitor has a lower price, ask the owner or manager if the item in question is a surplus part.

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150	ns	OKI	PLASTIC		@	\$5.67

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EPROM

27128	250	ns	HITACHI	16Kx8	@	\$26.40
2764	200	ns	HITACHI	8Kx8	@	\$10.65
2532	450	ns	HITACHI	4Kx8	@	\$4.80
2732	450	ns	HITACHI	4Kx8	@	\$5.40
2716-1	350	ns	AMD	2Kx8	@	\$4.56
2716	450	ns	HITACHI	2Kx8	@	\$3.60
2732A-25	250	ns	HITACHI	4Kx8	@	\$8.75

**CAUTION: Do not program the 2732A in a 2732 socket. The suffix A requires 21 v max programming voltage vs the standard 25 v.

STATIC RAM

5565P-15	150 ns	TOSHIBA	8Kx8 NMOS/CMOS	@	\$43.00
6264LP-15	150ns	HITACHI	8Kx8 NMOS/CMOS	@	\$45.00
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Lotus Symphony

Continued from page 74

Symphony, which will be offered at an introductory price of \$695, requires a computer with a minimum 320k bytes of random access memory. The program can run on a single disk drive.

Information can be viewed in Symphony from different points of view. At the same time, unrelated data and information can be displayed, if desired. For example, a spreadsheet and a graph made from the spreadsheet can be displayed on the screen at the same time by creating two windows with a few simple keystrokes. More windows can then be added to simultaneously view and process business letters, database reports, information from another computer, and so on. Alternatively, the user can display just one piece of information at a time

for the sake of simplicity.

For the typical user, Symphony's combination of tight integration and no-compromise individual functions eliminates the need for stand-alone software packages such as word processors, communications packages, spreadsheets, and graphics packages.

Symphony makes the most efficient use of microcomputer hardware. One important reason for its efficiency is that the entire program resides in user memory, eliminating the time-consuming need to transfer programs from disks to user memory.

Feature Highlights

WORD PROCESSOR

- Wang-like features (screen display, format controls, etc.)
- Intuitive, easy-to-use commands
- Reports, spreadsheets, tables, dynamically linked to documents

- Multiple documents on screen (or multiple views of same document)
- Mail-merge capability (in conjunction with database)
- Preview Mode (previews appearance of document as it will be actually printed)
- Ability to immediately edit documents received via communications

DATABASE

- Forms-oriented
- Automatic generation of user databases
- Mail-merge
- Multiple database capability
- Capacity for over 8,000 records
- Fast report generation using spreadsheet
- Easy entry, retrieval, and editing of data
- Three-level fast sort

COMMUNICATIONS

- Terminal emulation
- Asynchronous operations

- Automatic dial-up and log-on remote computers
- Point-to-point file transfer of any file
- Full user control of terminal characteristics
- Easy data capture with immediate user access to data
- Ability to instantly suspend session, analyze data, and immediately return to communications.
- X-modem file transmission protocol

SPREADSHEET

- Fast, complete operation
- 8,192 rows by 256 columns (largest spreadsheet in the industry)
- Full manipulation of text in formulas
- Advanced protection features

GRAPHICS

- Fast graph creation to allow "what-if" graphics
- Eight graph types:
 - Shaded, exploded pie charts
 - Open-High-Low-Close graphs for stock analysis
 - Area charts, Bar graphs, Stacked bar graphs, Line graphs and X-Y graphs
- Multiple graphs on screen simultaneously

SYMPHONY WINDOW MANAGEMENT SYSTEM

- Convenient viewing of all Symphony functions
- Fast creation and alteration of windows by user
- Simultaneous display of spreadsheets, documents, forms, graphs, and terminal sessions on screen

- Window "Zoom" key to temporarily enlarge window to full screen size
- Ability to overlap or "tile" windows side-by-side

SYMPHONY COMMAND LANGUAGE

- Lets users customize Symphony by automating manual processes
- Complete control over all Symphony functions
- "Learn" mode to quickly

ly record keystroke sequences

- High degree of program integrity with password protection

OPEN-ENDEDNESS

- Symphony is expandable in several ways:

- Add-in programs that work as part of Symphony system
- Custom programs created with Symphony Command Language
- Support of operating environments such as Microsoft Windows and Quarterdeck DesQ™

ADDITIONAL FEATURES

- Help screens
- On-disk tutorial
- Extensive three-part documentation featuring:
 - "Getting Started" booklet
 - "How-To" manual
 - Reference manual
- Extensive Lotus service and support
- Liberal trade-in policy for owners of 1-2-3™

Symphony can be completely adapted to international markets. To accomplish this, Lotus has developed the Lotus International Character Set (LICS), which will allow menus, prompts, and manuals to be translated, and will provide for correct time and data display and correct currency display.

Symphony runs without the need for a hard disk and will support 16-line displays on portable computers. Shipments of Symphony will begin at mid-year.

As part of its policy of providing its customers with the easiest possible access to new products, Lotus will initiate an unprecedented exchange allowance policy under which registered owners of 1-2-3™ will receive credit for the full price of that program against the purchase of Symphony. The company will continue to sell, service and support 1-2-3 for the thousands of computer users whose needs are fully satisfied by the program.

Lotus Development Corporation is a leading producer of software for desktop and portable computers. 1-2-3, the company's first product, was 1983's best-selling business applications program. The program was named a product of the year in 1983 by Fortune and Infoworld magazines.

For further information contact: Mel Webster, Miller Communications, 617-536-0470

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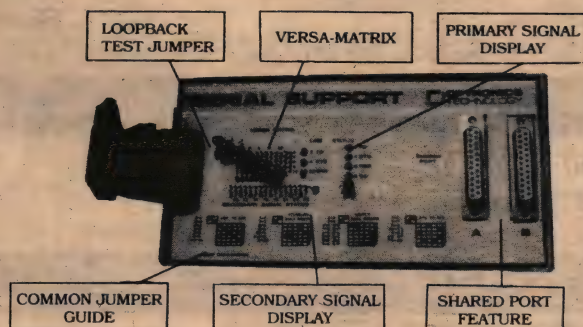
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Brother HR-1A 17 cps daisywheel, enhanced	\$715
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Graphic Printer-50 cps, 5x7 matrix, sprocket	\$199
NEC 3550	\$1965
NEC 7730	\$2145
Okidata-uses standard spool type ribbons	
u82A-serial/parallel/friction/sprocket	\$405
u84AP-200cps, 132 column, parallel	\$955
u92-160cps, 80 column, parallel	\$495
u93-160cps, wide	\$895
Prowriter (C.Itoh 8510A)-120cps, proportional	\$372
Prowriter II (C.Itoh 1550A)-wide carriage	\$665
Gemini 15-15" wide	\$455
Gemini 10x	350

FOR APPLE & FRANKLIN

Advanced Logic Systems-high performance, low price	
CP/M Card-2/64K, CP/M 3.0	\$290
Z-Card II List \$169	\$135
Smartterm II List \$179	\$145
dBase II (requires CP/M)	\$419
Davong 10 MByte hard disk	\$1695
Davong 18 MByte tape backup	\$1465
Dumpling GX-like Grappler*	\$105
Dumpling 16K-graphics and buffer, expandable	\$160
Gripper*	\$125
Hayes Micromodem II	\$275
Hayes 1200 B	\$450
Hayes Micromodem II with Terminal Program	\$295
Hayes 1200	\$595
Magic Window/Word/Calc pkg	\$235
Microsoft MULTIPLAN	\$192
Rana Elite One-Yes, it works	\$265
Rana Elite One Plus-with controller	\$355
Rana Elite Two-double storage	\$435
Rana Elite Three-quadruple storage	\$555
Serial Interface	\$105
SSM Modemcard w/SOURCE	\$285
SuperCalc	\$165
VISTA QUARTET (2 drives, thin, 640K, controller)	\$615
Vista V-1200, 6MB removable cartridge system	\$1225
Wordstar	\$185

MODEMS

Hayes Smartmodem 300	\$215
Hayes Smartmodem 1200-outsells the rest	\$599
Hayes 1200B	\$450
Novation J-CAT	\$110
Novation 103/212 SMART (direct connect)	\$385
Novation 103 SMART (direct connect)	\$179
RIXON R212A-300/1200 SMART	\$365

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AST I/O= Serial, Game, Clock	\$149
AST ComboPlus with 64K, serial, parallel, clock	\$257
AST MegaPlus 64K, serial, parallel, clock	\$292
AST MegaPak 256K for megaPlus	\$245
Davong 10MByte Hard Disk	\$1735
Davong 18MByte Hard Disk	\$1650
dBase II for PC-Dos	\$429
Lotus 1-2-3	\$335
Keytronics keyboard	\$195
RAM SETS (64K with parity)-EXPANDS ALL IBM	\$50
RIXON PC212A MODEM	\$375
Tandon TM100-2	\$245
Tandon TM100-4 with DOS-FIX	\$335
TEAC 320K Half-Height	\$285

CORONA DATA SYSTEMS

Systems include half-height 320K drives, 128K RAM expandable to 512K on-board, 640x325 graphics, green monitor with 16x13 matrix characters, serial port, parallel port, DOS, BASIC and spreadsheet software	
PC-11 drive List \$2595	\$2095
PC-22 drive List \$2995	\$2375
PC-HD 10MByte hard disk List \$4494	\$3495
PPC-1 Portable/1drive List \$2395	\$1950
PPC-2 Portable/2drives List \$2795	\$2250

WABASH DISKETTES

Single Side Single Density 5 boxes	\$17.50/box
Single Side Double Density 5 boxes	\$21.00/box
Double Side Double Density 5 boxes	\$32.00/box

Chameleon "The Compatible Computer"

LOCAL SALES ONLY
\$1995

TELEVIDEO TERMINALS

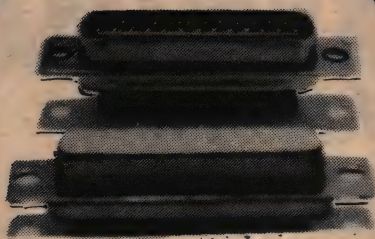
TV-910-Plus	\$565
TV-910	\$565
TV-925	\$725
TV-950	\$915
TV-970	\$1095

VIDEO MONITORS

Amdek 300G	\$142
Amdek 300A	\$165
Amdek 310G-for IBM monochrome adaptor	\$175
Amdek 310A-amber for IBM	\$185
Amdek Color I-13" color composite	\$294
BMC 12" Green-not fancy, but it works	\$94
BMC 13" Color-composite	\$294
BMC 13" RGB with card for Apple II	\$395
Dynax 12" Green (GM-120)	\$129
Dynax 12" Amber (AM-121)-970 line resolution	\$145
IBM MONOCHROME green	\$345
Princeton Graphics HX-12 RGB for PC	\$485
Taxan VISION-III-hi-res for IBM at II-E	\$533

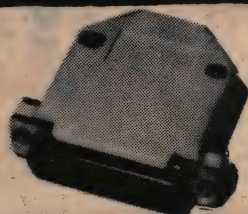
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"D" SERIES CONNECTORS



SOLDER POT

Part #	QTY 1-49	QTY 50-99	QTY 100-up
9P	1.46	1.34	1.22
9S	1.98	1.82	1.65
15P	2.00	1.84	1.67
15S	2.66	2.44	2.22
25P	2.20	2.02	1.83
25S	3.00	2.75	2.50
37P	4.00	3.67	3.33
37S	6.00	5.50	5.00
50P	5.08	4.66	4.23
50S	7.82	7.17	6.52



GRAY HOODS

Part #	QTY 1-49	QTY 50-99	QTY 100-up
GH9	1.02	.95	.85
GH15	1.04	.97	.87
GH25	1.06	.98	.88
GH37	1.18	1.08	.98
GH50	1.32	1.20	1.10



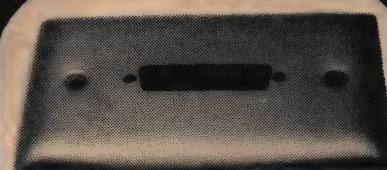
RIBBON CABLE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDC9P	4.00	3.67	3.33
IDC9S	4.28	3.93	3.57
IDC15P	4.86	4.46	4.05
IDC15S	5.24	4.81	4.37
IDC25P	5.24	4.81	4.37
IDC25S	5.82	5.37	4.92
IDC37P	8.22	7.54	6.85
IDC37S	8.92	8.18	7.43
IDC50P	CALL	CALL	CALL
IDC50S	CALL	CALL	CALL



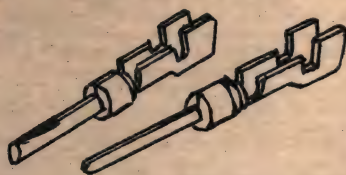
P.C. MOUNT

Part #	QTY 1-49	QTY 50-99	QTY 100-up
P9P	1.58	1.45	1.32
P9S	2.60	2.39	2.17
P15P	2.10	1.93	1.75
P15S	3.66	3.36	3.05
P25P	2.90	2.66	2.42
P25S	4.39	4.02	3.65
P37P	4.30	3.94	3.58
P37S	8.18	7.50	6.82
P50P	5.50	5.04	4.58
P50S	10.70	9.81	8.92



WALL PLATES

Part #	QTY 1-24	QTY 25-49	QTY 50-up
232WP-1	4.95	4.05	CALL
232WP-2	5.95	4.80	CALL
232WP-3	6.95	5.55	CALL



CONTACTS FOR CRIMP SHELLS

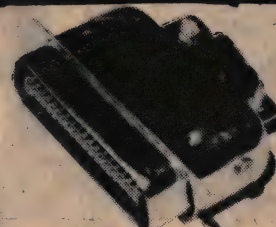
(GOLD)

Part #	QTY PER PKG 25	QTY PER PKG 100	QTY PER PKG 1000
CP20P Male Pin	.08	.07	.06
CP20S Female Pin	.09	.08	.08



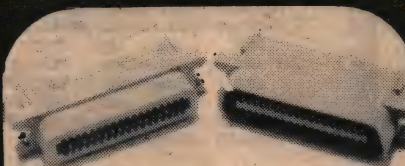
CRIMP SHELLS

Part #	QTY 1-49	QTY 50-99	QTY 100-up
C9P	.86	.79	.72
C9S	.90	.83	.75
C15P	.88	.81	.73
C15S	.92	.85	.77
C25P	.90	.83	.75
C25S	.94	.86	.78
C37P	1.04	.96	.87
C37S	1.06	.97	.88
C50P	1.14	1.05	.95
C50S	1.20	1.10	1.00



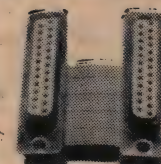
CENTRONICS SOLDER TYPE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
CEN36P MALE	4.50	3.92	3.36



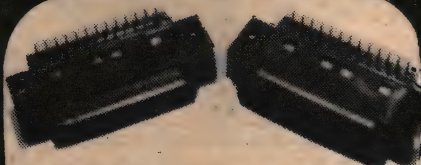
RIBBON CABLE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDC36P Male	6.95	6.50	6.15
IDC36F Female	7.95	7.60	7.15



GENDER CHANGERS RS 232 DB 25

Part #	QTY 1-49	QTY 50-99	QTY 100-up
AGC-M Male			10.50
AGC-F Female			11.70



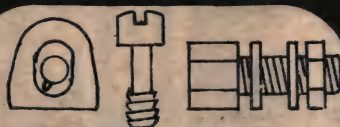
P.C. MOUNT RT ANGLE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
R9P	2.54	2.33	2.12
R9S	2.60	2.39	2.17
R15P	2.98	2.73	2.48
R15S	3.10	2.84	2.58
R25P	3.72	3.41	3.10
R25S	3.00	2.75	2.50
R37P	4.70	4.31	3.92
R37S	4.90	4.49	4.08
R50P	CALL	CALL	CALL
R50S	CALL	CALL	CALL



WIRE WRAP

Part #	QTY 1-49	QTY 50-99	QTY 100-up
W9P	2.30	2.11	1.92
W9S	3.20	2.94	2.67
W15P	3.36	3.08	2.80
W15S	4.70	4.31	3.92
W25P	5.40	4.87	4.33
W25S	7.34	6.73	6.12
W37P	6.92	6.35	5.77
W37S	9.90	9.08	8.25
W50P	10.24	9.39	8.53
W50S	13.04	11.96	10.87



D SERIES HARDWARE

SET OF 2	QTY 1-49	QTY 50-99	QTY 100-up
FDM-1 FEMALE "D" HDWR	.85	.75	.65
MDH-1 MALE "D" HDWR	.65	.58	.49



PIN EXTRACTOR

Each 2.75



IDS-SOCKET

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDS-10	1.15	1.05	.09
IDS-14	1.35	1.20	1.05
IDS-16	1.45	1.30	1.15
IDS-20	1.50	1.35	1.20
IDS-26	2.40	2.25	2.10
IDS-34	2.90	2.50	2.25
IDS-4	3.50	3.25	3.00
IDS-50	4.25	3.95	3.80
IDS-60	5.80	5.30	4.95



IDE EDGE CARD

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDE-10	1.90	1.80	1.70
IDE-20	2.25	2.00	1.80
IDE-26	2.65	2.50	2.40
IDE-34	2.95	2.50	2.10
IDE-40	3.50	3.25	3.00
IDE-50	4.25	3.95	3.50

RIBBON CABLE CONNECTORS

IDH PC HEADER

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDH-10	.80	.75	.70
IDH-20	1.15	1.09	1.03
IDH-26	1.50	1.42	1.33
IDH-34	1.95	1.85	1.73
IDH-40	2.30	2.20	2.08
IDH-50	2.85	2.70	2.55
IDH-60	3.45	3.27	3.10



IDH-PC-RT ANGLE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDH-10R	.80	.75	.70
IDH-20R	1.20	1.14	1.07
IDH-26R	1.50	1.43	1.37
IDH-34R	2.00	1.89	1.82
IDH-40R	2.40	2.27	2.15
IDH-50R	2.95	2.80	2.65
IDH-60R	3.85	3.60	3.47



IDH WIRE WRAP RT ANGLE

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDH-10WR	2.45	2.32	2.18
IDH-20WR	2.60	2.47	2.35
IDH-26WR	3.25	3.09	2.93
IDH-34WR	3.80	3.60	3.43
IDH-40WR	4.65	4.43	4.20
IDH-50WR	5.55	5.30	5.00



IDH WIRE WRAP

Part #	QTY 1-49	QTY 50-99	QTY 100-up
IDH-10W	1.50	1.44	1.37
IDH-20W	2.55	2.42	2.30
IDH-26W	3.20	3.05	2.90
IDH-34W	3.75	3.54	3.37
IDH-40W	4.50	4.27	4.05
IDH-50W	5.50	5.22	4.95

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ALTEX ELECTRONICS

RIBBON CABLE

IDE-EDGE CARD TO IDS-SOCKET

PART #	DESCRIPTION	PRICING
10S-10E	10 Pin IDS to 10 Pin IDE	3.05 + 20¢ ft.
20S-20E	20 Pin IDS to 20 Pin IDE	3.75 + 40¢ ft.
26S-26E	26 Pin IDS to 26 Pin IDE	5.05 + 52¢ ft.
34S-34E	34 Pin IDS to 34 Pin IDE	5.85 + 68¢ ft.
40S-40E	40 Pin IDS to 40 Pin IDE	7.00 + 80¢ ft.
50S-50E	50 Pin IDS to 50 Pin IDE	8.50 + 1.00 ft.

RS-232-DB-25

PART #	DESCRIPTION	PRICING
25M-25M	Male to Male	10.50 + 65¢ ft.
25M-25F	Male to Female	11.70 + 65¢ ft.
25F-25F	Female to Female	12.25 + 65¢ ft.

CENTRONICS TO IDS-40

PART #	PRICING
36M-40S	11.50 + 80¢ ft.

IDS-SOCKET TO IDS-SOCKET

PART #	DESCRIPTION	PRICING
10S-10S	10 Pin to 10 Pin	2.30 + 25¢ ft.
14S-14S	14 Pin to 14 Pin	2.70 + 28¢ ft.
16S-16S	16 Pin to 16 Pin	2.90 + 32¢ ft.
20S-20S	20 Pin to 20 Pin	3.00 + 40¢ ft.
26S-26S	26 Pin to 26 Pin	4.80 + 52¢ ft.
34S-34S	34 Pin to 34 Pin	5.80 + 68¢ ft.
40S-40S	40 Pin to 40 Pin	7.00 + 80¢ ft.
50S-50S	50 Pin to 50 Pin	8.50 + 1.00 ft.
60S-60S	60 Pin to 60 Pin	11.60 + 1.20 ft.

DIP CABLES

PART #	DESCRIPTION	PRICING
14D-14D	14 Pin to 14 Pin	2.60 + 28¢ ft.
16D-16D	16 Pin to 16 Pin	3.30 + 32¢ ft.
24D-24D	24 Pin to 24 Pin	4.50 + 48¢ ft.
40D-40D	40 Pin to 40 Pin	7.80 + 80¢ ft.

GENDER MENDERS RS-232

PART #	DESCRIPTION	PRICING
GM-25	Male-Female to Male-Female	22.50 + 65¢ ft.

CENTRONICS TO IDE-34

PART #	PRICING
36M-34E	10.00 + 75¢ ft.

CENTRONICS

Part #	DESCRIPTION	PRICING
36M-36M	Male to Male	13.80 + 80¢ ft.
36M-36F	Male to Female	14.40 + 80¢ ft.
36F-36F	Female to Female	15.00 + 80¢ ft.

EDGE CARD TO EDGE CARD

PART #	DESCRIPTION	PRICING
20E-20E	20 Pin to 20 Pin	4.50 + 40¢ ft.
26E-26E	26 Pin to 26 Pin	5.50 + 52¢ ft.
34E-34E	34 Pin to 34 Pin	5.90 + 68¢ ft.
40E-40E	40 Pin to 40 Pin	7.00 + 80¢ ft.
50E-50E	50 Pin to 50 Pin	8.50 + 1.00 ft.

CUSTOM RIBBON CABLES ALSO AVAILABLE, PRICES QUOTED UPON REQUEST

DIN PLUGS

PART #	#PINS	QTY 1-49	QTY 50-99	QTY 100-up
DP-3	3 PIN	.75	.65	.55
DP-4	4 PIN	.75	.65	.55
DP-5	5 PIN	.75	.65	.55
DP-6	6 PIN	.85	.75	.65
DP-8	8 PIN	.85	.75	.65

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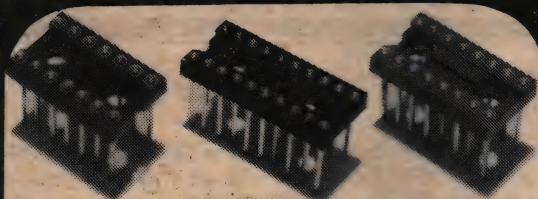
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MACHINE PINS/GOLD CONTACTS

PART #	QTY 1-49	QTY 50-99	QTY 100-up
HST-8	.60	.57	.53
HST-14	.80	.75	.70
HST-16	.90	.86	.81
HST-18	1.00	.96	.91
HST-20	1.10	1.05	1.00
HST-22	1.35	1.28	1.20
HST-24	1.35	1.28	1.20
HST-28	1.55	1.48	1.41
HST-40	2.25	2.13	2.01

WIRE WRAP

PART #	QTY 1-49	QTY 50-99	QTY 100-up
HW-8	1.30	1.21	1.13
HW-14	1.80	1.70	1.60
HW-16	2.10	1.99	1.88
HW-18	2.40	2.29	2.18
HW-20	2.50	2.38	2.26
HW-22	2.90	2.76	2.63
HW-24	3.15	2.99	2.83
HW-28	3.70	3.51	3.33
HW-40	5.40	5.09	4.83



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DIP CONNECTORS

PART #	QTY 1-49	QTY 50-99	QTY 100-up
1DP14	1.30	1.25	1.20
1DP16	1.65	1.55	1.45
1DP24	2.25	2.15	2.05
1DP40	3.90	3.65	3.45

ALCO-DT-08 8 POS. DIP SWITCH

1-49	50-99	100-up
75¢	65¢	55¢

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ALTEX ELECTRONICS

MISCELLANEOUS

The Education of a Binary Retardate

by Burton Rubin

Last month, we discussed in detail the advantages of using

hexidecimal notation in formatting integral subroutines with full graphics dump capabilities. Actually, I just

wanted to see if you were paying attention - last month we didn't discuss anything in detail, nor are we likely to this month. We are not concerned with trivia like hardware and software here; this is real life kid, and we're concerned with feelings; yours, mine and the computers. As a neophyte, one is subjected to certain indignities. It's tough, as a mature (read "old") adult, to walk into a computer store whose staff has a median age of sixteen, with a problem that most of these kids have been able to solve by the time they finished teething. Example: I bought my 'puter, my disk drive, and a really peachy color monitor, along with about thirty pounds of reference guides, instruction manuals, tutorials, and other helpful volumes, all of which were clearly translated from the original Bulgarian by somebody who hated the English language. Now, I'm not a particularly stupid person (or so I thought) but most of this stuff floored me. Before I could use a disk, I read, it must be formatted. Dimly, I could even understand why this was so. I consulted the "Users Guide". No luck. No entries at

all on the subject. I grabbed the "Programmers Reference Guide," a really impressive volume. Nuttin. I dug out the

Users Manual for the disk drive. It agreed that disks must be formatted, but declined to

Continued on page 82

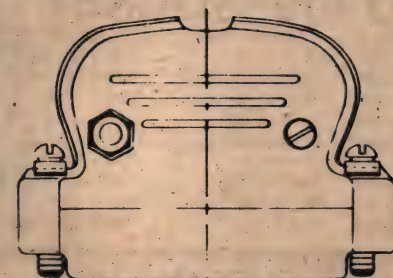
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With Annual Inventory coming up, our Materials Manager wants to clear his stockroom to make room for additional items being added to our product line. The following items are being offered at our cost.

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4. Hayes Stack Chronograph, New	\$150
5. Hayes S-100 Modem, Used	\$195
6. Anadex DP8000 80 Col. Printer, Used	\$350
7. BDT Sheet Feeder for Diablo, Demo	\$850
8. BDT Sheet Feeder for NEC, Used	\$600
9. Quasar Hand Held Computer in a Briefcase, New	\$1050
10. Racal Vadic Model 3450 Modem, New	\$650
11. InfoSystems Design Calendar Clock Board, New	\$85
12. Diablo 1650 KSR Printer Serial, Demo	\$1200
13. Diablo 620 RO Parallel, New	\$850
14. Epson MX80 Parallel, New	\$575

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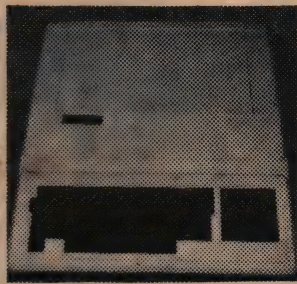
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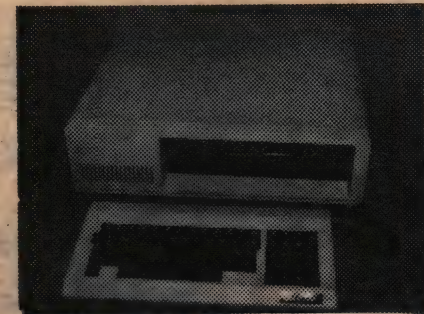
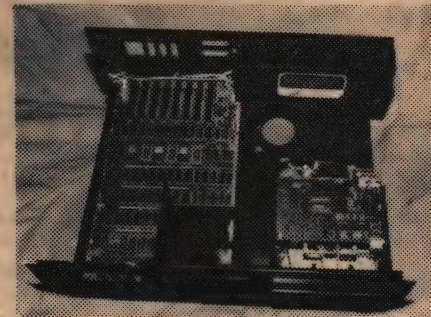
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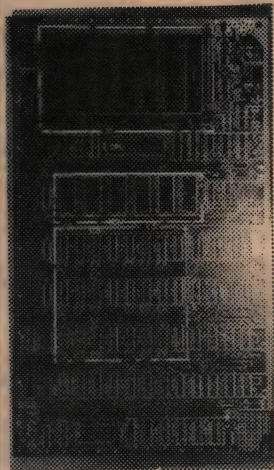
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IBM PC™ ???



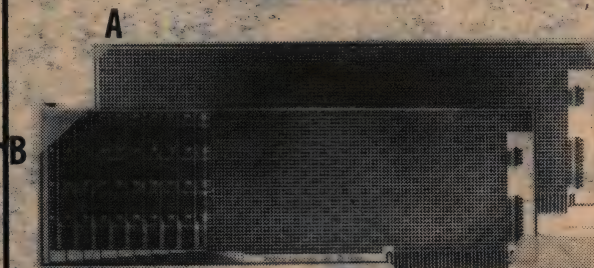
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Binary Retardate Continued from page 80

tell me how to accomplish such a feat. I went back to my friendly local computer store. The salesman I dealt with was having his own problems - his voice was changing. He was more than helpful though; he pried his three buddies away from a game of "Bandits" and they went into a huddle. Eventually they emerged, and gave me a sheet of paper with

cabalistic markings. I rushed home, and assumed a position of supplication in front of the computer. "open 15, 8, 15," I intoned, Kinda like Ali Baba at the cave. It didn't work. I came to a makeshift solution. I booted up (I'm proud that I learned to say that) Magic Desk, a cartridge designed to let the Commodore 64 be operated by chimpanzees. Magic Desk in turn formatted my disks. It was not the most satisfactory solution, but it

worked. Three days later, my friend called. Wonder of wonders, he had gotten a Commodore 64 too. His friend was a whiz at computers, and was showing him all the good stuff. It was all very simple. He had just one problem. Did I know how to format a disk? Eventually, I discovered the proper way to plead with the computers to have it do what its supposed to do. Not taking any chances, I had the formula tattooed on my left wrist.

Now I'm working on how to close files. Fortunately, I'm rather corpulent, and I've plenty of room for tatoos. I'm just not sure that Steve Jobs started this way, though.

When I got my current pride and joy, my printer, the users guide was plainly marked, "A Friendly Introduction to Your 1526 Dot Matrix Printer". The word "Friendly", I discovered is applied to any computer or peripheral that does not actually electrocute you when you

plug it in. I read the friendly Users Guide. Twice. Most of it seemed to be written in Martian. I particularly liked the section about installing the paper. Space constraints don't permit me to quote directly, but suffice it to say, that nowhere in the section did it explain how to install the paper. It did have a real nice line drawing of a moose being born, though. Eventually, I got the paper installed. To my shock, the thing actually works beautifully. I love it. I find myself using my word processor to write shopping lists. Deep in my soul, though, I have a nagging fear. I try to keep it suppressed, but it keeps coming back. I know what it is. Sooner or later, I'm going to want to get a Modem. ●

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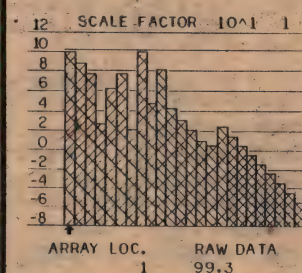
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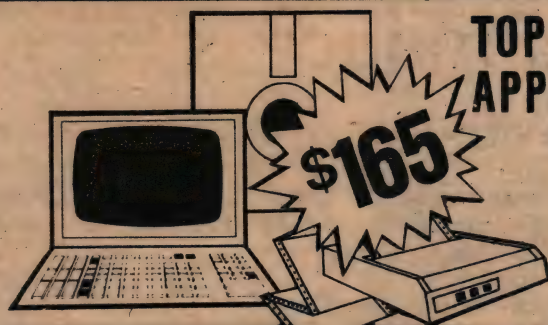
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The Seequa 325 comes with dual 3 1/4" drives storing 360K each, 128K of RAM, 9" green phosphor-monitor, dual processors 8088 and Z80, IBM style keyboard, serial and parallel ports, color and black and white graphics, bundled software including Perfect Writer, Perfect Calc, Perfect Speller, MS-DOS 2.0, GW BASIC and C-Term -- all for \$2,495. Quantity shipments began in late March.

Seequa chose the three and one-quarter inch Tabor drives for their data storage system because of its reliability and compactness. In addition, they wanted Seequa 325 users to have a ready supply of proven application software to run on their new product.

Seequa believes the three and one-quarter inch disk drives represent state-of-the-art technology. These drives offer better portability and protection from contamination.

Therefore, Seequa was pleased to announce this joint venture with Dysan and Tabor.

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tion is one of the leading manufacturers of IBM-

Continued on page 85

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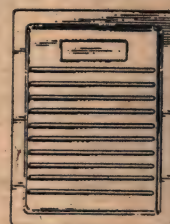
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Continued from page 84

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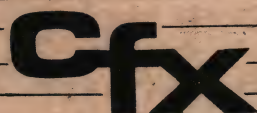
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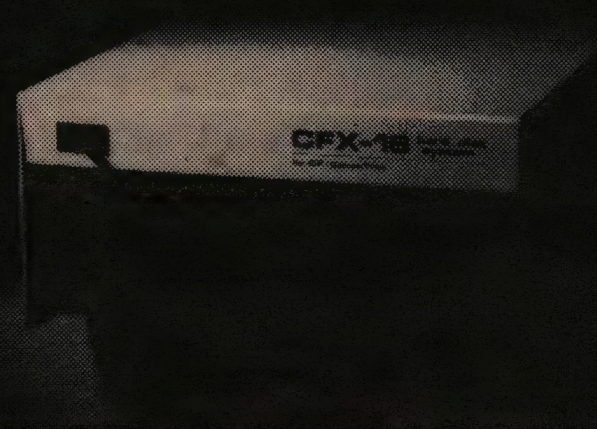
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2134	Nato Commander D	34.95 26.90
0101	NEC 1215 Color Monitor	399.00 333.35
0240	NEC 8023 Printer	499.00 432.90
0273	NEC 8023 Ribbon 2-Pac	19.95 17.10
0263	Neutral Zone D	34.95 26.00
1756	Nukewar C	15.00 10.40
2703	Odin D	49.95 34.60
2193	Omnicalc D	79.95 55.35
2947	Pac-Man R	44.95 37.00
2842	Paper Clip D	125.00 86.55
2893	Paral' Printer Ext. Cable 6'	34.95 21.80
1957	Pharaoh's Curse C	34.95 24.20
1953	Pharaoh's Curse D	34.95 24.20
0650	PI-3 12 in Amber Monitor	249.00 162.00
2044	Pilot D	59.95 37.70
2834	Pinball D	29.95 20.70
2915	Pinball Const Set D	40.00 30.75
2679	Pipes R	34.95 24.20
2184	Pitstop R	40.00 27.70
2201	Planetfall D	49.95 34.60
2177	Pooyan C/D	29.95 20.70
2983	Powerfile D	130.00 99.95
2820	Practicalc D	55.95 38.05
1894	Quick Brown Fox R	65.00 49.00
2711	Rhymes & Riddles D	29.95 20.75
0503	Riteman Plus Printer	399.00 312.80
2950	Robotron 2084 R	44.95 37.00
2965	Sanyo PR5500 Printer	995.00 762.85
2993	Sargon 2 D	34.95 24.20
2681	Save New York R	34.95 24.20
2043	Sea Wolf R	29.95 13.85
1762	Seafox R	39.95 27.60
1959	Shamus C	34.95 24.20
1948	Shamus D	34.95 24.20
0587	Simons Basic R	24.95 16.05
1416	Smith Corona TP1 Ribbon	7.95 6.35
1937	Snooper Troops #1 D	39.95 27.60

CAT#	LIST	SALE
2710	Snooper Troops #2 D	\$29.95 \$20.75
2837	Software Automouth D	59.95 41.45
0374	Solo Flight C	34.95 26.90
2952	Solo Flight D	34.95 26.90
2968	Spider Eater D	29.95 21.95
2725	Star Battle D	24.95 17.30
2935	Star Trek R	39.95 27.60
1881	Starcross D	39.95 27.65
2949	Stargate R	44.95 37.00
1277	Starwriter Film Ribbon	5.50 4.50
1278	Starwriter Nylon Ribbon	5.75 4.65
2715	Story Machine R	39.95 27.65
2250	Supertext Pro D	99.00 66.00
1952	Survivor D	34.95 24.20
1877	Suspended D	49.95 34.50
1843	Sword Of Fargoal C	30.00 20.80
1838	Sword Of Fargoal D	30.00 20.80
0346	Tax Advantage D	69.95 44.85
1259	Taxan 12 in Amber Monitor	189.00 138.65
1258	Taxan 12 in Green Monitor	179.00 131.60
1528	Taxan Color Mntr W/Audio	399.00 305.50
1758	Telengard C	23.00 15.95
0444	Telengard D	28.00 19.40
1842	Temple of Apshai C	40.00 27.70
1836	Temple of Apshai D	40.00 27.70
2162	Trashman R	29.95 20.75
1281	Trunk Floppy Storage	29.95 21.50
2195	Turtle Graphics II R	59.95 41.50
1915	Type Attack D	39.95 27.65
0680	Type Tutor/Word Invade C	21.95 15.20
0679	Type Tutor/Word Invade D	24.95 17.30
0884	Ultima 3 D	54.95 38.05
1841	Upper Reaches Apshai C	20.00 13.85
1837	Upper Reaches Apshai D	20.00 13.85
1721	Verbatim SS/DD Hardpack	35.00 27.60
0093	Verbatim SS/DD Softpack	34.00 26.95
1826	Video Pack 80	179.95 135.00
1072	VIP Terminal D	49.95 41.65
0002	Wico Joystick	29.95 21.95
0015	Wico Redball Joystick	34.95 24.40
0008	Wico The Boss Joystick	19.95 14.10
1885	Witness D	49.95 34.60
2889	Wordpro 3+ W/Spell D	99.95 75.00
0264	Worms D	40.00 30.75
2871	Your Commodore 64	14.95 12.50
1822	Z80 Video Pack W/C/PMR	299.95 224.95
2175	Zaxxon C	39.95 27.65
0577	Zaxxon D	39.95 27.65
1878	Zork I D	39.95 27.60
1879	Zork II D	39.95 27.65
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0560	Algebra I	39.95	27.60
0723	Algebra V & VI (2-Disk)	49.95	34.50
1142	Alien Addition (Home)	34.00	26.75
0013	Alpha Plot	39.50	27.25
2598	Alphabet Zoo	29.95	20.70
0434	Apple Cat 2 Modem	389.00	278.10
0151	Apple Mechanic	29.50	20.35
0309	Applewriter 2 Pre-Boot	24.00	16.95
0090	Appli-Card (6 MHz)	375.00	281.30
0536	Assembly Lines (Book)	19.95	15.35
2905	Axis Assassin	35.00	26.95
0042	Bag of Tricks	39.95	27.65
0501	Bank Street Writer	69.95	48.35
0277	Battle For Normandy	39.95	27.65
0278	Beagle Bag	29.50	20.35
0126	Beagle Basic	34.95	24.20
0658	Beneath Apple DOS	19.95	13.85
0111	Book of Apple Software '84	19.95	12.80
0096	Bookends	125.00	86.40
1676	BPI General Accounting	395.00	273.45
2599	Broadsides	39.95	27.70
0545	Bufferboard-Grappler	175.00	132.55
1682	Buffered Grappler + (16K)	239.00	178.00
0448	Bumble Games	39.95	27.65
2805	Business Accountant 2/2E	255.00	196.15
0228	Castle Wolfenstein	29.95	20.70
0734	CDEX How to Use Apple IIE	59.95	41.50
0733	CDEX Visicalc Training	59.95	41.50
0656	Chart-Macintosh	125.00	86.55
0386	Chess	69.95	48.35
2612	Chivalry	49.95	34.60
0740	Compu-Math/Arith. Skills	49.95	34.50
0654	Compu-Read	29.95	20.70
0743	Compu-Spell System	29.95	20.70
0416	Compuserve Starter Kit	39.95	24.35
1138	Computer Sat (Harcourt)	79.95	62.85
1731	Copy 2 Plus	39.95	25.65
1295	Creature Creator	39.95	27.65
2862	Cubit	39.95	27.65
2910	Cut & Paste	50.00	38.50
0777	Data Capture IIE	90.00	62.35
0059	David's Midnight Magic	34.95	24.00
1265	DB Master Version 4	350.00	242.35
0052	Deadline	49.95	34.50
0189	Decathalon	29.95	20.70
0630	Delta Drawing	49.95	34.60
1143	Demolition Division (Home)	34.00	26.75
2951	Dig Dug	34.95	29.10
1722	Disk Boxes (5 Color Coded)	25.00	12.50
2866	Disk Drive Ext Cable	19.75	16.70
2833	Disk Quik	29.50	20.45
1444	Diversi-DOS	30.00	5.00
0409	Dollars & Sense	100.00	69.25
2939	Donkey Kong	34.95	29.10
0216	DOS Boss	24.00	16.60
0983	Double Take	34.95	24.15
0424	Dow Jones Market Analyzer	350.00	293.75
2877	Drol	34.95	24.20
2600	Eagles	39.95	27.70
0360	Early Games Young Children	29.95	20.75
1384	Echo 2 Speech Synthesizer	149.95	125.60
0811	Einstein Compiler	129.00	89.30
0661	Elementary Apple	14.95	10.35
0092	Elephant Disks SS/DD (10)	37.00	24.35
1337	Elephant Disks SS/SD (10)	34.00	21.15
0729	Enhancer II/Function Strip	215.00	161.30
0107	Epson MX-80 Ribbon 2-Pac	28.00	12.55
0029	Essential Data Duplicator	79.95	52.00
0039	Executive Secretary	250.00	173.10
0314	EZ Port II	34.95	24.20

CAT#		LIST	SALE
0280	Facemaker	\$34.95	\$24.20
0553	Flex Text	29.50	20.35
2821	Flight Simulator II	49.95	38.05
2918	Flip & File W/Lock (50)	39.95	23.85
1440	Flip-N-File (50 Disks)	29.95	18.85
2796	Fontrix	75.00	64.10
1427	Format II Enhanced	150.00	103.85
0554	Frame-Up	29.50	20.35
1127	Game Show	39.95	31.40
0046	General Manager II	229.95	158.90
0533	Geopolitique 1990	39.95	27.65
0573	Gertrude's Puzzles	44.95	31.15
2843	Global PLE/Beagle Bros	49.95	34.60
0043	Graphics Magician	59.95	41.40
0094	Grappler +	165.00	128.00
2902	Hardhat Mac	35.00	26.95
2880	Hayes Joystick Mach III	54.95	38.05
2817	Hayes Joystick Mach II	44.95	31.15
1437	Head Cleaning Kit	29.95	17.30
0197	Home Accountant	74.95	48.05
2804	Home Word	49.95	34.60
1684	How To Pgrm In Applesoft	49.95	34.60
1589	In Search Of Amazing Thing	39.95	27.60
2853	Incredible Jack	179.00	123.95
2325	Jane W/Mouse	295.00	204.25
0449	Juggles Rainbow	29.95	20.75
1442	Kindercomp	29.95	20.70
0003	Knight Of Diamonds	34.95	24.20
1693	Koala Graph Tablet—Apple	124.95	83.50
2954	Krell Logo	89.95	81.15
2972	Labels—1" White (1000)	9.95	6.75
2890	Learning Bridge Made Easy	79.95	55.35
1463	Legacy of Lylgamyn	39.95	27.65
0050	Letter Perfect	149.95	103.60
0403	Lisa 2.6	79.95	61.75
0310	List Handler	64.95	44.95
0806	Locksmith 5.0	103.50	77.20
0982	Lode Runner	34.95	24.15
0194	Magic Window 2	150.00	103.85
0192	Master Type	39.95	27.65
0089	Maxell MD1 Disks-SS/DD (10)	51.90	28.75
2901	Memorymaster 2E/64K Exp	169.00	140.85
2147	Micro Cook-Appetizers-2E	12.00	8.50
2146	Micro Cook-Soups/Salads-2E	12.00	8.50
0437	Micro Cookbook	40.00	27.65
2148	Micro Cookbook IIE	40.00	27.65
0692	Microline 92-P Printer	599.00	CALL
1509	Microline Ribbon	3.20	2.20
2958	Microline Tractor Feed	65.00	57.70
2802	Micromodem IIE W/Smartcom I	329.00	246.75
0627	Microsoft Basic-Mac	150.00	103.85
1347	Millionaire	59.95	41.50
1135	Minus Mission (Home)	34.00	26.75
1124	Mockingboard	129.00	105.50
1400	Moptown Hotel	39.95	27.65
0580	Multiplan (Apple DOS)	250.00	173.10
0655	Multiplan-Mac	195.00	135.00
2903	Music Const. Set	40.00	30.75
0101	NEC 1215 Color-Monitor	399.00	333.35
0240	NEC 8023 Printer	499.00	432.90
0273	NEC 8023 Ribbon 2-Pac	19.95	17.10
0423	Nibble's Away II	69.95	53.25
0179	Old Ironsides	39.95	27.65
2908	One On One	40.00	30.75
1328	Orange (AC Surge Protect)	139.95	96.90
1531	Orca/M	149.95	103.80
2941	Pac-Man	34.95	29.10
2893	Paral' Printer Ext. Cable 6'	34.95	21.80
0635	Parallel Interface W/Cable	139.50	62.85
0616	Personal Touch	89.00	70.55
1413	PFS File IIE	125.00	85.95
1415	PFS Graph IIE	125.00	85.95
1414	PFS Report IIE	125.00	85.95
0372	PFS Solutions/Ledger 2E	20.00	13.85
2809	PFS Write IIE	140.00	96.95
0650	PI-3 12 in Amber Monitor	249.00	162.00
0495	Pie Writer 2.2 (40/80)	149.95	103.85
2907	Pinball Const. Set (E.A.)	40.00	30.75
1292	Pkaso-Universal Infrace	175.00	132.60
0659	Power of Visicalc	14.95	10.35
0584	Preschool IQ Builder I	23.95	16.60
0461	Pronto DOS	29.95	20.35
1279	Prowriter Nylon Ribbon	13.50	4.50
1446	Q-Disk Emulator	529.00	363.10
0047	Quest	34.95	24.20
2111	Ramcard 16K (MPC)	99.00	60.25
0634	Ramcard 16K Microtek	129.00	71.55
0955	Ramcard 16K Prometheus	99.00	56.55
1386	Ramcard 16K Wizard	95.00	62.85
0140	Ramcard 16K-Microsoft	99.95	75.00

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0574	Rocky's Boots	49.95	34.60
0195	Sanyo 5500 Printer	995.00	728.90
0561	Sat Word Attack Skills	49.00	33.90
1303	Saturn 128K RAM Board	499.00	374.30
0133	Screenwriter II	129.95	89.00
0041	Sensible Speller IV	125.00	86.50
0400	Silicon Salad	24.95	17.25
1416	Smith Corona TP1 Ribbon	7.95	6.35
0465	Snooper Troops 1	44.95	31.15
0138	Softcard	345.00	253.00
0271	Software Automouth	124.95	86.35
0250	Spellgraph	39.95	27.65
1291	Spellicopter	39.95	27.65
0631	Spelling Bee Games	39.95	27.70
0274	Spy's Demise	29.95	20.75
2030	SSM Transend 1	89.00	67.85
2906	Standing Stones	40.00	30.75
1277	Starwriter Film Ribbon	5.50	4.50
0435	Step-By-Step	89.95	62.30
1447	Step-By-Step II	89.95	62.30
0100	Sticky Bear A B C	39.95	27.65
0099	Sticky Bear Numbers	39.95	27.65
0292	Story Machine	34.95	24.20
1374	Sup'r Mod—Universal	69.95	53.05
1445	Supertext Pro (40/80)	175.00	121.15
0001	System Saver	89.95	69.20
1259	Taxan 12 in Amber Monitor	189.00	138.65
1258	Taxan 12 in Green Monitor	179.00	131.60
1528	Taxan Color Mntn W/Audio	399.00	305.50
0236	Terrapin Logo	149.95	103.85
0137	TG Game Paddles	39.95	27.65
0136	TG Joystick W/Toggle	59.95	41.50
1330	TG Joystick W/Toggle IIE	64.95	45.00
1730	The Accountant	99.00	64.10
2597	The Accountant—VCalc Intfc	20.00	15.40
0462	Tip Disk #1	20.00	13.85
1281	Trunk Floppy Storage	29.95	21.50
0544	Typefaces	20.00	13.85
0155	Typing Tutor 2	24.95	17.30
2836	Ultima 3 (Exodus)	54.95	38.05
0559	Ultraterm	379.00	284.30
0072	Ulysses & Golden Fleece	34.95	24.00
0062	Utility City	29.50	20.35
2992	Verbatim DS/DD (10)	46.50	37.20
1721	Verbatim SS/DD Hardpack	35.00	27.60
0093	Verbatim SS/DD Softpack	34.00	26.95
0063	Versaform	389.00	263.00
0361	Versaform Inv. Template	49.95	34.60
0648	Videoterm W/SS & Inverse	319.00	247.05
2900	Viewmaster 80 Column	169.00	140.80
2152	Visible Computer-6502	49.95	46.90
0150	Visicalc (Special)	250.00	172.00
1422	Visicalc IIE (Special)	250.00	172.00
0422	Visicalc Pre-Boot	49.00	33.95
0077	Visitrend/Visiplot	300.00	225.00
1480	Wico Analog Joystick	49.95	38.40
2936	Wildcard 2	139.95	107.10
2937	Wildcard Plus	169.95	130.50
0145	Wizard & Princess	32.95	22.75
0144	Wizardry	49.95	34.60
0984	Wizplus	39.95	27.60
1532	Wizprint	24.95	17.30
0284	Word Handlers Pkg.	169.95	117.65
0342	Word Juggler IIE W/Lexicheck	189.00	157.50
0249	Z-80 Plus Board	139.00	124.75
0521	Zaxxon	39.95	27.60
0296	Zork I	39.95	27.60
0141	Zork II	39.95	27.60
0379	Zork III	39.95	27.60

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2420	Algebra 1	39.95	27.70
2662	Alien Addition	34.00	23.55
2658	Alligator Mix	34.00	23.55
0696	Amdek 300A 12in Amber Mon	199.00	161.50
0104	Amdek 300G 12in Green	179.00	143.40
0272	Amdek Color III Monitor	479.00	383.25
0190	AST Comboplus 64K	395.00	296.55
0079	AST Megaplug 64K	395.00	296.55
0594	AST Sixpac Plus 64K	395.00	296.55
0930	ATI-BPI Gen Acctng (PC XT)	75.00	51.90
0918	ATI-Lotus 1-2-3 (PC XT)	75.00	51.90
0924	ATI-Supercalc	75.00	51.90
0925	ATI-Visicalc(PC XT)	75.00	51.90
0919	ATI-Wordstar Vols 1&2	75.00	51.90
2386	Aztec	39.95	27.70
2352	B-1 Nuclear Bomber	21.00	14.55
0952	Bank Street Writer	79.95	55.35
0946	Barron's Study for the SAT	89.95	62.30
1512	BASF Disks SS/DD(10)	35.00	21.40
2546	Basic Compiler	395.00	273.50
2480	Battle For Normandy	39.95	27.70
2962	BMC 13-in RGB Color Mntr	595.00	455.40
2807	Book of IBM Software	19.95	12.80
2813	BPI Accounts Payable	595.00	411.95
2814	BPI Accounts Receivable	595.00	411.95
1068	BPI General Accounting	595.00	411.95
0948	BPI Inventory Control	795.00	550.40
2812	BPI Payroll	595.00	411.95
2110	BPS Business Graphics	350.00	242.35
2592	Business Basic Compiler	600.00	415.40
2415	C Compiler (MS/DOS)	600.00	415.40
2410	CBasic Compiler (MS/DOS)	600.00	415.40
2370	CDEX Training for Visicalc	69.95	48.45
0971	CDEX Training-PC DOS 2.0	69.95	48.40
0959	CDEX Training-Supercalc	69.95	48.40
0932	Centipede	34.95	29.10
1020	Checkers	49.95	34.60
1019	Chess	69.95	48.40
2775	Computer Baseball	39.95	27.65
2358	Computer Football	21.00	14.55
0433	Copy 2PC	39.95	25.65
2515	CP/M 86	60.00	41.55
2395	Creature Creator	39.95	27.70
2458	Crisis Mountain	35.00	24.25
2553	Crosstalk XVI	195.00	135.00
2426	Curse of RA	20.00	13.85
1043	Dark Crystal Adv #6	37.95	26.25
2571	Data Capture	120.00	83.10
2988	Database Manager II	295.00	204.25
2636	DB Master	595.00	411.95
2593	DBase II (MS/DOS)	700.00	484.65
2344	Deadline	49.95	34.60
2456	Death in the Caribbean	35.00	24.25
0934	Defender	34.95	29.10
2773	Delta Drawing	49.95	34.60
2659	Demolition Division	34.00	23.55
2432	DGraph (MS/DOS)	295.00	204.25
0935	Dig Dug	34.95	29.10
1722	Disk Boxes (5 Color Coded)	25.00	12.50
2984	Disk Boxes—Individual	5.00	2.50
2554	Dollars & Sense	165.00	114.25
0937	Donkey Kong	34.95	29.10
2405	DR Logo (CP/M 86)	149.95	103.85
2357	Draw Poker	21.00	14.55
2746	Early Games Children	29.95	20.75
2747	Early Games Matchmaker	29.95	20.75
2749	Early Games Music	29.95	20.75
2516	Easyspeller II (PC DOS)	225.00	155.80
0995	Easywriter II System	395.00	273.45
2754	Einstein Speller (2 Drive)	149.95	103.80

CAT# LIST SALE

2753	Einstein Writer	\$300.00	207.70
2757	Einstein Writer/Ltr/Spell	399.00	276.25
1470	Elephant Disks DS/DD (10)	50.00	30.65
0092	Elephant Disks SS/DD (10)	37.00	24.35
2655	Enchanter	49.95	34.60
2481	Epidemic	34.95	24.20
0107	Epson MX-80 Ribbon 2-Pac	28.00	12.55
2575	Face Maker	34.95	24.20
2349	Financial Planner	700.00	484.65
2461	Flight Simulator	49.95	34.60
2918	Flip & File W/Lock (50)	39.95	23.85
1440	Flip-N-File (50 Disks)	29.95	18.85
2637	Fraction Fever	34.95	24.20
2594	Friday (MS/DOS)	295.00	204.25
0721	Game Show	39.95	27.65
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Ware Re-Creates Conquistador Age Of Exploration

Electronic Arts has announced the release of new educational software that re-creates the Spanish exploration of the New World. Called "Seven Cities of Gold," the

program features accurate geographical and climatological representation of the Americas, and gives the player an appreciation of the obstacles encountered by the

Conquistadors.

In addition to representing North and South America, Seven Cities generates a "random continent"—further increasing the sense of exploring

the unknown. Whether using the historical or the unknown map, players must petition the king to finance their expeditions; suffer his displeasure if the amount of gold they return is inadequate; allocate resources such as food, ships and goods to barter; and decide how to deal with different native populations.

"We wanted Seven Cities to be the first historical novel on a computer," said Joe Ybarra, producer at Electronic Arts. "It is intended to be more of an emotional experience than a mere repetition of history. When people play Seven Cities, they experience the same sense of excitement they get from reading a good novel."

Seven Cities of Gold is available for Atari home computers.

Encourages Attention to Details

Seven Cities of Gold begins play in a three-dimensional representation of an Old

World city where the players are the adventurers. This city includes the adventurer's home, where players can study maps made during previous explorations; the court; and the outfitters, where players spend the king's gold on men, ships, food and goods for barter.

Even at this early stage of the game, players need to manage their available resources. Players have a limited amount of gold and must decide how to apportion it among ships, men, food and goods. The adventurers must have enough men to wage a successful campaign, sufficient food to feed these men for many weeks and goods to barter with. Any miscalculation in allocation could spell disaster for the mission.

In order to capture fully the different experiences of the early Conquistadors, Electronic Arts created native encampments reflecting five degrees of civilization—ranging from primitive hunting tribes to sophisticated empires like the Incas. Explorers must decide how best to deal with the native populace, who can be at times hostile, curious or a complex combination of both. Players' actions determine the success of their missions and the lives of their men.

Upon discovering and entering a town, options flash on screen that affect the tone of the contact. Players can be cautious, moderate or reckless. Their behavior in turn affects the actions of the natives.

It is precisely these choices and their consequences that educate the players regarding the hazards of aggression and greed and the benefits of careful planning. Depending on each encounter, players can establish forts or missions as outposts for future exploration.

Seven Cities was created for Electronic Arts by Ozark Software. This multitasking group of software designers is responsible for the prize-winning game M.U.L.E.

Price and Availability

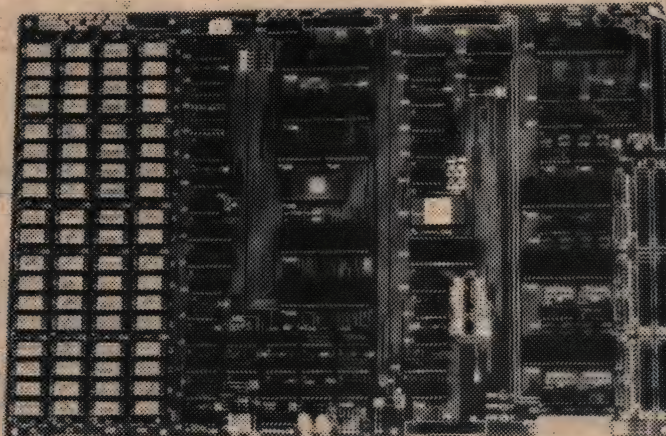
Seven Cities of Gold is available now for the Atari family of home computers. A version of the software for the Commodore 64 will be available in June. It has a suggested retail price of \$40.

Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. Terrylynn Pearson, 415-571-7171.

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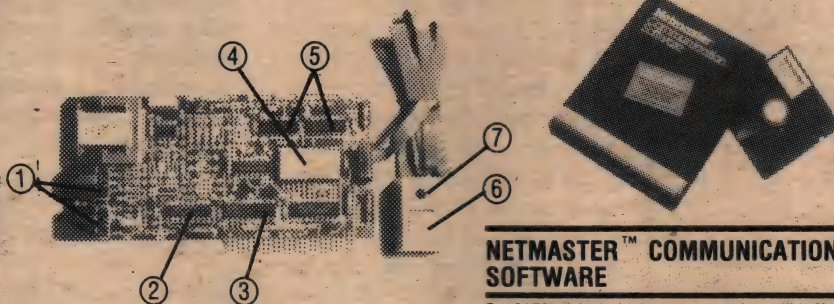
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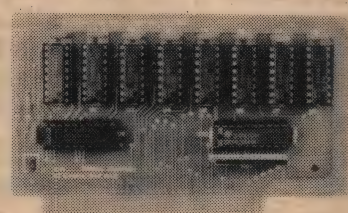
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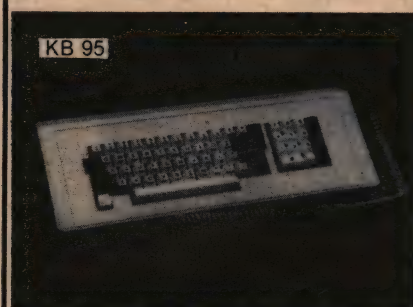
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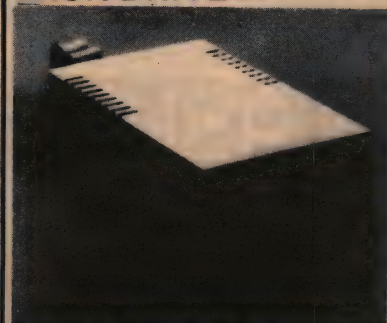
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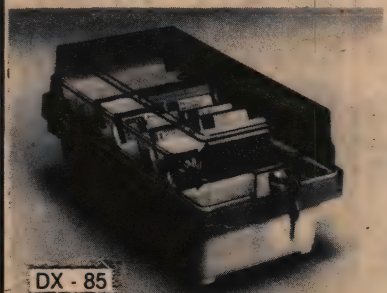
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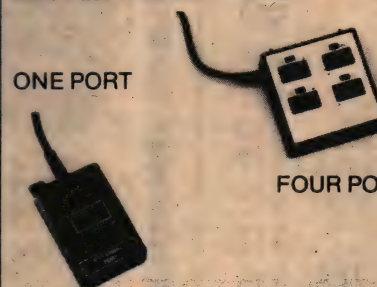
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Bookkeeping Software Continued from page 92

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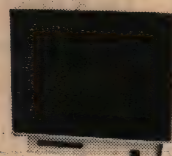
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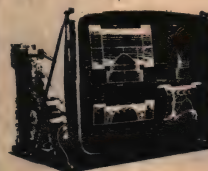


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(All you need for complete system with boards) All for			\$3500	

LEXIDATA/CALMA

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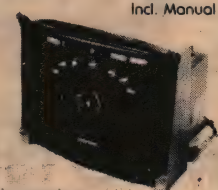
THE PERFECT MONITOR

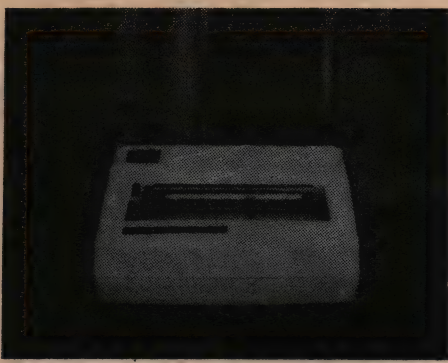
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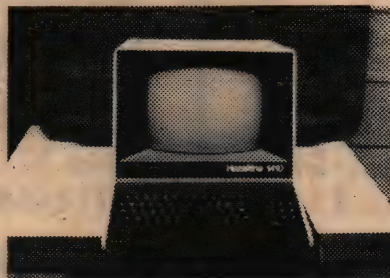
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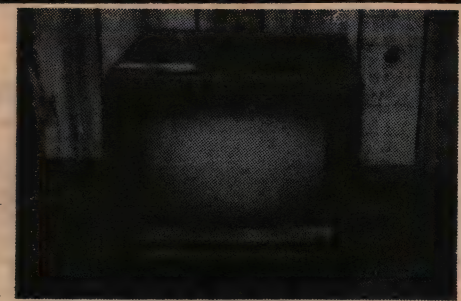
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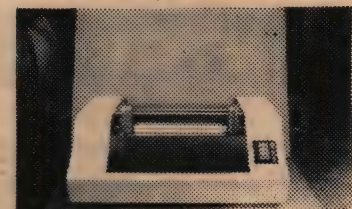
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APPLE

Memories Are Made Of This Part III

by Don Lancaster

Memories Are Made Of This by Don Lancaster excerpted from his book, *Micro Cookbook, Volume 1 (Fundamentals)* \$15.95 each, published by Howard W. Sams & Co., Inc.

By special arrangement with Don Lancaster & Howard W. Sams & Co., Inc.

Static Random-Access Memories

So far, we have seen how to put a few memory cells into an integrated-circuit package. To meet the needs for micro memory, we will want to put many more cells in each chip. A thousand memory cells per package sounds like a lot, but a thousand-cell memory package is just about the smallest we even think about these days. What we really need is ways of getting 16K, 32K, 64K, and even more cells inside one integrated circuit.

If we are going to cram this many cells into such a small space, each cell has to be both very small and very simple. Any scheme we can think up in order to minimize how many wires it takes to read and write to each cell will also be most helpful.

Our hold-follow transparent latch took four gates, an inverter, two I/O lines, and two control lines. While we can live with this sort of thing for a few memory cells, anything this messy has to go if we need lots

of memory cells on one chip.

Let's see what is involved in building large RAMs. Then we can look at the commercial RAM chips available today. We already have seen that there is a static RAM that will hold its ones and zeros so long as power is applied, and there is a dynamic RAM that introduces a new hassle called *refresh*. Dynamic RAM cells are smaller and cheaper than static RAM cells. You tend to use dynamic RAM in larger systems and for larger memories.

Any particular memory size traditionally starts out with hard-to-use dynamic parts, and then gets upgraded to improved and simpler-to-use dynamic parts with only a few use problems. Finally, no-hassle static parts become available. At this writing, static memory chips of 16K and dynamic memory chips of 64K are readily available, although mainstream parts are still in the 4K static and 16K dynamic range.

For openers, let's start with some static RAM concepts. At first, we will keep the input and output lines separate and only use 1-bit words. Later on, we will find out how to use wider words and common I/O bus pins.

Matrix Addressing

Ideally, it should take only one simple something to form our memory cell and, thus, only a "fraction" of a lead should be needed to get at the cell.

The "fraction" comes about through some sneaky arrangements of the cells so that the leads on the package get *shared* as many ways as is possible.

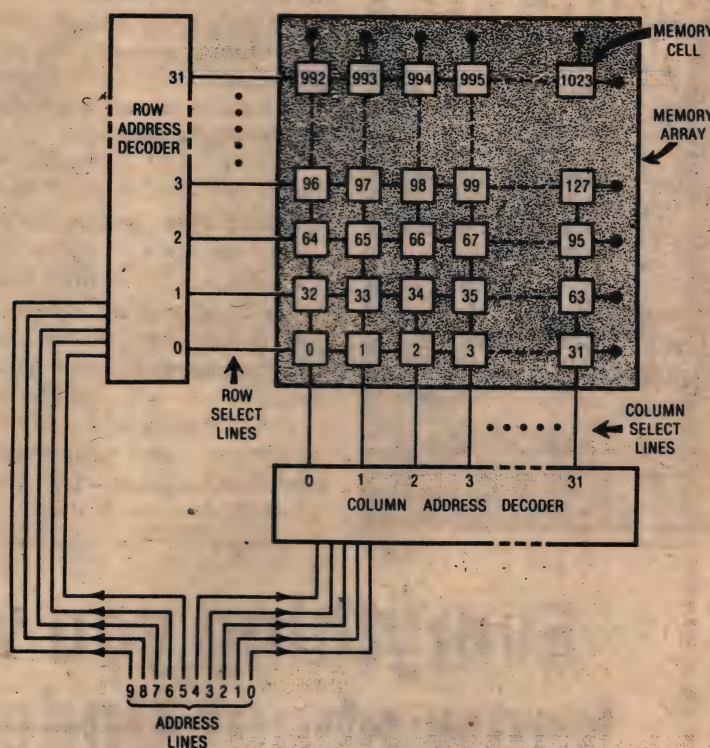
For instance, if you strung out 1024 memory cells in a row, it would take at least 1024 access leads. If, instead, you use a *matrix*, or row-column arrangement, you can arrange your 1024 cells into an array that is 32 cells wide by 32 cells high. Now, as few as 32 row lines and 32 column lines can handle a job that seemed to need at least 1024 leads. In the larger memory chips, some even more impressive savings are possible.

And so,...

MATRIX—The grouping of memory cells so that they form rows and columns.
ARRAY—The memory cells in a matrix.

Let's look at a matrix arrangement....

1024 MEMORY CELLS IN AN ARRAY



Continued on page 98

DATA ACQUISITION

The DAS816 is a complete data acquisition and control board for the Apple II, Apple II+, and the Apple IIe. It has sixteen analog input channels and a bit for bit programmable eight bit I/O port. Each input channel has eight bits of resolution and a 100uS conversion rate. On board firmware is provided to drive the system from BASIC and machine code.

The DAS816 data acquisition board is priced at only \$279.95. Just mention you saw this ad in the Computer Shopper and save 10% on the established price. HURRY! This offer expires August 15, 1984. Please include shipping and Wisconsin sales tax.

OEM and dealer inquiries are welcome.

IHM INSTRUMENTS

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Memories

Continued from page 97

Here we have grouped 1024 memory cells into a row-column array that is 32-cell rows high by 32-cell columns wide. Each row is addressed by one of 32 internal row select lines and each column is addressed by one of 32 internal column select lines.

To further reduce the number of leads we need, each

of the 32 row lines and the 32 column lines comes from a row decoder or column decoder. Only five bits are needed for the input to either decoder, so there are five row address lines and five column address lines. A total of ten input leads are needed to address the 1024 individual cells this way. This is the best we can hope to do with binary-coded input lines, since ten lines are needed to represent 2^{10} or 1024 different addresses.

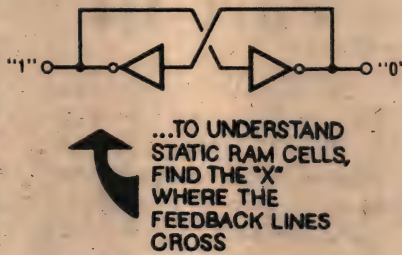
Each cell also has to have read and write circuitry in addition to a method to respond only to its unique row and column address. This requirement to read and write to each individual cell is an obvious complication.

In fact, I/O complicates things so badly that the semiconductor people have figured out sneaky ways to let the column address lines also be the input writing and output reading lines. Instead of using a matrix like we have shown, we will go to a modified matrix in which the columns will select unique cells as well as read and write. We will see how shortly.

The point here is that if you have lots of cells, you absolutely must go to some scheme to minimize the complexity of each cell and, also, minimize the wires needed to get at each cell.

Let's once again look at our simple memory cell made from two cross-coupled inverters...

STATIC RAM CELL



We have redrawn things so that the inverters face away from each other. We also have renamed the Q and Q outputs as bit lines called "1" and "0". Outside of this, it is the same circuit we used before.

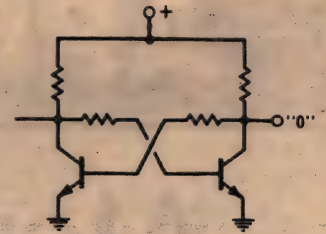
To tell what state we are in, we look at or sense the "1" and "0" lines. This is also how we read our cell. To write to our cell, we use the "1" and "0" lines to force the cell into one

of its two possible states. To write a "1" into the cell, ground the "0" line and hold the "1" line high. To write a "0" into the cell, ground the "1" line and make the "0" line high. This is done just about the same way as we mechanically triggered our simple latch.

What is in the inverters? It depends on the device. We have a choice of bipolar (ordinary transistor) memory cells, NMOS cells, or CMOS cells. Bipolar is fast and expensive. CMOS is very low power but is also fairly expensive. This leaves NMOS as today's most popular family for micro RAMs.

If we were building our static memory cell out of resistors and bipolar npn transistors, one version might look like this...

STATIC RAM CELL (BIPOLAR)



An npn transistor conducts a high collector current when a small base current is present. The same transistor prevents practically all collector current in absence of base current. It behaves as a simple switch. Provide base current to turn the transistor on. Stop base current to turn the transistor off.

Assume the right transistor

Continued on page 99

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Memories

Continued from page 98

in the sketch is on. It is shorting its "0" output to ground by pulling down the collector resistor from the positive power supply. This low output deprives the other transistor of base current, so the left transistor is off. An off transistor draws no base current, so the left output is a high, or a "1". This high left output provides base current to the right transistor, keeping it on and holding the state for us.

The other state is equally stable, with the right transistor off, allowing a high right output and providing the base current needed to keep the left transistor on and, thus, holding a low left output.

To read to this cell, sense what is on the "1" and "0" lines. To write to the cell, ground the "1" line for a zero and ground the "0" line for a one.

You can get sneaky and eliminate the series base resistors in this cell. It will still work since the on collector-saturation voltage of 0.2 volt is less than the minimum 0.6 volt needed to activate the base of a transistor. The outputs will now only swing 0.4 volt, but we still have a useful memory cell and have thrown out two of the six parts needed, and perhaps have gained some speed through the lower voltage swings. Note that on a 64K memory, saving two parts per cell adds up to 131,172 components that you can leave off your chip!

But bipolar transistor memory cells are usually current hogs. Most of today's RAM uses N-channel field-effect transistors instead. The circuit looks different, but it works pretty much the same way. Like this...

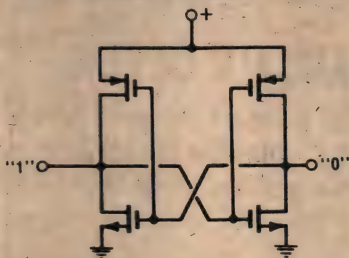
resistors made from polycrystalline silicon.

Again, assume the right transistor is on. It is holding the "0" output line low. The right transistor's output is also depriving the left transistor of a gate voltage, so the left transistor is off. The left transistor, being off, provides a high output on the left, or "1" side. This high output reaches around and gives us the positive gate voltage we need to hold the right NMOS device on.

NMOS devices are usually smaller than bipolar devices and can run on much less operating current. The manufacturing steps are also simpler, so the most economical memory cells you can buy today are all NMOS technology.

Our CMOS static memory cell looks very weird...

STATIC RAM CELL (CMOS)



Here we have N-channel or NMOS transistors on the bottom just like we did with the NMOS cell. But the resistors of the bipolar or NMOS cells have been replaced by PMOS transistors.

Now, follow the bouncing ball. NMOS transistors are turned off with zero gate voltage and on with positive gate voltage. PMOS transistors are turned off with zero gate voltage and are turned on with negative gate voltage.

The circuit is set up so that one NMOS and the opposite PMOS transistor are on at any

one time. Suppose that the right output is low. This means that the bottom right transistor in the sketch is on and the top right transistor is off. Since the right output is low, the left bottom transistor will be off and the left top transistor will be on. This pulls the left, or "1", output high.

And, this high output on the left is what we need to turn on

Continued on page 100

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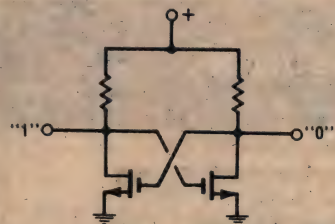
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STATIC RAM CELL (NMOS)



The two NMOS transistors behave just about the same as the previous npn transistors, only their gate inputs are voltage rather than current controlled. Make the gate positive, and the NMOS device turns on. Ground the gate, and the NMOS device turns off.

The load resistors can be either "real" resistors or, else, other NMOS transistors biased as current sources. The latest versions of NMOS static cells are back to using actual

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Memories

Continued from page 99

the lower right transistor and to turn off the upper right transistor, holding the cell in this state.

The other state, as always, is equally stable and useful. The two states are decided by which diagonally opposite pair of transistors will turn on, forming the remaining two off.

But, wait a minute. In the "1" high state, there is no current path from the positive supply to ground. In the "1" low state, there is also no current path from the positive supply to ground. This is unlike either the NMOS or bipolar circuits where you had supply current in one or the other of the load resistors.

Which says that a CMOS memory needs zero supply power to hold a memory state! So we can expect CMOS cells to use much less supply power than NMOS or bipolar cells.

Unfortunately, we can't just throw the power supply away. Any time we want to change the contents of a CMOS cell, a tiny amount of energy will be needed to charge and discharge circuit strays. And, as you go faster and faster with a CMOS

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memory cell, more and more supply current will be needed.

So, CMOS cells are great for holding values for long times, using tiny currents from backup batteries, or even a big capacitor. But they do draw a reasonable amount of current when run at normal circuit speeds.

Saying things differently, the standby current of CMOS cells is negligible compared to other cells, but the operating current is only somewhat lower during normal high-speed usage.

There's no doubt that CMOS is the best overall low-power memory cell. But, it is larger than NMOS and harder to build since you somehow have to isolate the PMOS transistors from the NMOS ones. Besides that, it is fairly hard to get high-speed operation from a CMOS cell.

Today, the NMOS cell is the choice for most micro uses, with bipolar RAM saved for high-speed special needs and CMOS reserved for where micropower operation or long data-hold times are important.

To be continued next month...

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The first three Maccessories, which was available in late April, was the SWIVEL, the SURGE SUPPRESSOR and the STARTER PACK.

"The Macintosh may be light, but its rubber feet really get a good grip on your desktop. It's difficult to adjust the Mac's position", says Newmark. The Maccessories SWIVEL is a light weight lazy suzan that fits neatly under the Macintosh, allowing you to adjust the viewing angle of the Macintosh with the touch of a finger. And since the SWIVEL is attached to the bottom of the Macintosh with Velcro, it goes where the Macintosh goes, including inside the Macintosh carrying case.

"The Macintosh is a portable computer, which means you never know where you'll be plugging it in next" says Newmark. "This makes the Mac very susceptible to power

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Additional Maccessories, available in May and June will include: a Macintosh compatible PRINTER BUFFER; a rugged 300 baud PORTABLE MODEM for those of you who don't want to risk lugging around a delicate and expensive 300/1200 baud modem when you travel; a DISK

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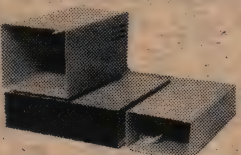
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TEXAS INSTRUMENTS

Innermost Secrets Of TI99/4A

Part VII

by Randy Holcomb

In the previous installment we examined the format of the Peripheral Access Block (PAB) structure that is used for the Device Support routines. In this, the final installment, we will examine the workings of a live DSR (The RS232 card) and explain the structure and the requirements necessary to implement a DSR for a peripheral.

Each DSR is stored in ROM at address >4000, and is activated by setting the appropriate CRU address of the device on. In most cases, the DSR is activated by setting the zero bit on at the DSR address block. In the case of the RS232 card, the DSR address is at >1300; so having register 12 loaded with >1300 and doing a SBO 0 instruction activates the DSR ROM. Once activated, NO OTHER DSR can be active until the current active DSR is shut off. To shut off a DSR, the DSR base address must be loaded into register 12, then an SBZ 0 is issued. As a rule, this is of no concern to the DSR programmer as the DSRLNK routine handles DSR linkages.

The format of how a DSR is structured is well-defined in order to allow for minimal overhead of system calls to DSRs and allow the DSR to have enormous flexibility in handling device operations. The major elements that constitute a DSR include: The Symbol Definition Block, which serves to define the memory interface requirements for the DSR with the console; the Header/Linkage blocks which the DSR is required to define to allow DSRLNK to perform its linking function, and the main code section which actually performs the operation. The

main section is responsible for determining the I/O operation to be performed, setting any special device switches, buffering the data, and perform any error handling that is needed. Two other functions that the DSR may be required to perform is to pre-initialize the device by means of a power-up routine and for devices that run in an interrupt mode, a special interrupt routine is defined to process interrupt requests from the device.

The Symbol Definition Block consists of defining EQUs that the DSR programmer can use to make programming easier. Normally, the Symbol Definition Block is defined as per the TI Standard Definition:

PAD	EQU	->E0
FAC	EQU	PAD + >4A
ROLO	EQU	PAD + >E1
RILO	EQU	PAD + >E3
OPCODE	EQU	FAC
FLAGS	EQU	FAC + 1
BUFADR	EQU	FAC + 2
LRECL	EQU	FAC + 4
CHARCT	EQU	FAC + 5
RECNR	EQU	FAC + 6
SCROFF	EQU	FAC + 8

OPTLEN
DEVLEN
PABVDP

EQU
EQU
EQU

FAC + 9
FAC + 10
FAC + 12

Where PAD is the start of the CPU RAM in the console, FAC is the start of the scratch-pad area available for use by the DSR, and ROLO and RILO are Registers 0 and 1 of the WP that the DSR is given when the DSR is called. During the scan by DSRLNK it looks at the header and linkage blocks; once DSRLNK finds the proper device in the table it loads the address into register 9 and then DSRLNK issues a BL *R9 and turns control over to the DSR. At this point you can store the current workspace pointer into any register (R4 is preferred) and via displacement addressing any location in CPU RAM may

be addressed by the DSR.

The header/linkage block definition can be best examined by looking at the RS232 disassembly. Starting at location >4000 you notice the value of >AA01. The first byte >AA is required by the DSR support; this indicates a valid DSR is present. The next byte can have any value; it is normally used to indicate a version number. The next word is not used by the DSR; its value is zero. At location >4004 is the value >4010, which points to a two word sequence >0000 and >40F4. This is the vectors for the power-up routine which we will examine later. The next 2 words (with the first word contains >0000 again) is the pointer to the device

names/linkages. For now let's look at the first location that it is pointing to, >4016. Looking at the data at >4016 we see that it is pointing to >4020. Following this word is >416E. The >4020 is the next device name/linkage to process should this device name fail the device name matching of DSRLNK. The >416E is the location that the system is to proceed to, should the device name match. Following the entry address of >416E is the length of the device name (1 byte) and the actual device name. So, ROM >4016 thru >401F is the pointer to the next device

Continued on page 109

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4034	1.95	74C76	.80
4035	.85	74C83	1.95
4040	.75	74C85	1.95
4041	.75	74C86	.39
4042	.69	74C89	4.50
4043	.85	74C90	1.19
4044	.79	74C93	1.75
4046	.85	74C95	.99
4047	.95	74C107	.89
4049	.35	74C150	5.75
4050	.35	74C151	2.25
4051	.79	74C154	3.25
4053	.79	74C157	1.75
4060	.89	74C160	1.19
4066	.39	74C161	1.19
4068	.39	74C162	1.19
4069	.29	74C163	1.19
4070	.35	74C164	1.39
4071	.29	74C165	2.00
4072	.29	74C173	.79
4073	.29	74C174	1.19
4075	.29	74C175	1.19
4076	.79	74C192	1.49
4078	.29	74C193	1.49
4081	.29	74C195	1.39
4082	.29	74C200	5.75
4085	.95	74C221	1.75
4086	.95	74C244	2.25
4093	.49	74C373	2.45
4098	2.49	74C374	2.45
4099	1.95	74C901	.39
14409	12.95	74C902	.85
14410	12.95	74C903	.85
14411	11.95	74C905	10.95
14412	12.95	74C906	.95
14419	7.95	74C907	1.00
14433	14.95	74C908	2.00
4502	.95	74C909	2.75
4503	.65	74C910	9.95
4508	1.95	74C911	8.95
4510	.85	74C912	8.95
4511	.85	74C914	1.95
4512	.85	74C915	1.19
4514	1.25	74C918	2.75
4515	1.79	74C920	17.95
4516	1.55	74C921	15.95
4518	.89	74C922	4.49
4519	.39	74C923	4.95
4520	.79	74C925	5.95
4522	1.25	74C926	7.95
4526	1.25	74C928	7.95
4527	1.95	74C929	19.95

UARTS

AY5-1013	3.95
AY3-1015	6.95
PT1472	9.95
TR1602	3.95
2350	9.95
2651	8.95
IM6402	7.95
IM6403	8.95
INS8250	10.95

GENERATORS BIT-RATE

MC14411	11.95
BR1941	11.95
4702	12.95
COM5016	16.95
COM8116	10.95
MM5307	10.95

FUNCTION

MC4024	3.95
LM566	1.49
XR2206	3.75
8038	3.95

MISC.

UPD7201	29.95
TMS99532	29.95
ULN2003	2.49
3242	7.95
3341	4.95
MC3470	4.95
MC3480	9.00
11C90	13.95
95H90	7.95
2513-001 UP	9.95
2513-002 LOW	9.95

CLOCK CIRCUITS

MM5314	4.95
MM5369	3.95
MM5369-EST	4.25
MM5375	4.95
MM58167	12.95
MM58174	11.95
MSM5832	3.95

KEYBOARD CHIPS

AY5-2376	11.95
AY5-3600	11.95
AY5-3600 PRO	11.95

6800

68000	49.95
6800	2.95
6802	7.95
6803	19.95
6808	13.90
6809E	14.95
6809	11.95
6810	2.95
6820	4.35
6821	2.95
6828	14.95
6840	12.95
6843	34.95
6844	25.95
6845	14.95
6847	11.95
6850	3.25
6852	5.75
6860	7.95
6875	6.95
6880	2.25
6883	22.95
68047	24.95
68488	19.95
6800 = 1MHZ	
68B00	10.95
68B02	22.25
68B09E	29.95
68B09	29.95
68B10	6.95
68B21	6.95
68B40	19.95
68B45	19.95
68B50	5.95
68B00 = 2 MHZ	

6500

6502	4.95
6504	6.95
6505	8.95
6507	9.95
6520	4.35
6522	6.95
6532	9.95
6545	22.50
6551	11.85
6502A	6.95
6522A	9.95
6532A	11.95
6545A	27.95
6551A	11.95
6502B	9.95

DISC CONTROLLERS

CONTROLLERS	
1771	16.95
1791	24.95
1793	26.95
1795	29.95
1797	49.95
2791	54.95
2793	54.95
2795	59.95
2797	59.95
6843	34.95
8272	39.95
UPD765	39.95
MB8876	29.95
MB8877	34.95
1691	17.95
2143	18.95

TMM20162K x 8 STATIC
200 ns**\$4¹⁵****HM6264**8K x 8 STATIC
150 ns**\$39⁹⁵****74LS00**

74LS00	.24	74LS173	.69
74LS01	.25	74LS174	.55
74LS02	.25	74LS175	.55
74LS03	.25	74LS181	2.15
74LS04	.24	74LS189	8.95
74LS05	.25	74LS190	.89
74LS08	.28	74LS191	.89
74LS09	.29	74LS192	.79
74LS10	.25	74LS193	.79
74LS11	.35	74LS194	.69
74LS12	.35	74LS195	.69
74LS13	.45	74LS196	.79
74LS14	.59	74LS197	.79
74LS15	.35	74LS221	.89
74LS20	.25	74LS240	.95
74LS21	.29	74LS241	.99
74LS22	.25	74LS242	.99
74LS26	.29	74LS243	.99
74LS27	.29	74LS244	1.29
74LS28	.35	74LS245	1.49
74LS30	.25	74LS247	.75
74LS32	.29	74LS248	.99
74LS33	.55	74LS249	.99
74LS37	.35	74LS251	.59
74LS38	.35	74LS253	.59
74LS40	.25	74LS257	.59
74LS42	.49	74LS258	.59
74LS47	.75	74LS259	2.75
74LS48	.75	74LS260	.59
74LS49	.75	74LS266	.55
74LS51	.25	74LS273	1.49
74LS54	.29	74LS275	3.35
74LS55	.29	74LS279	.49
74LS63	1.25	74LS280	1.98
74LS73	.39	74LS283	.69
74LS74	.35	74LS290	.89
74LS75	.39	74LS293	.89
74LS76	.39	74LS295	.99
74LS78	.49	74LS298	.89
74LS83	.60	74LS299	1.75
74LS85	.69	74LS323	3.50
74LS86	.39	74LS324	1.75
74LS90	.55	74LS352	1.29
74LS91	.89	74LS353	1.29
74LS92	.55	74LS363	1.35
74LS93	.55	74LS364	1.95
74LS95	.75	74LS365	.49
74LS96	.89	74LS366	.49
74LS107	.39	74LS367	.45
74LS109	.39	74LS368	.45
74LS112	.39	74LS373	1.39
74LS113	.39	74LS374	1.39
74LS114	.39	74LS375	.95
74LS122	.45	74LS377	1.39
74LS123	.79	74LS378	1.18
74LS124	2.90	74LS379	1.35
74LS125	.49	74LS385	3.90
74LS126	.49	74LS386	.45
74LS132	.59	74LS390	1.19
74LS133	.59	74LS393	1.19
74LS136	.39	74LS395	1.19
74LS137	.99	74LS399	1.49
74LS138	.55	74LS424	2.95
74LS139	.55	74LS447	.95
74LS145	1.20	74LS490	1.95
74LS147	2.49	74LS624	3.99
74LS148	1.35	74LS640	2.20
74LS151	.55	74LS645	2.20
74LS153	.55	74LS668	1.69
74LS154	1.90	74LS669	1.89
74LS155	.69	74LS670	1.49
74LS156	.69	74LS674	14.95
74LS157	.65	74LS682	3.20
74LS158	.59	74LS683	3.20
74LS160	.69	74LS684	3.20
74LS161	.65	74LS685	3.20
74LS162	.69	74LS688	2.40
74LS163	.65	74LS689	3.20
74LS164	.69	81LS95	1.49
74LS165	.95	81LS96	1.49
74LS166	1.95	81LS97	1.49
74LS168	1.75	81LS98	1.49
74LS169	1.75	25LS2521	2.80
74LS170	1.49	25LS2569	4.25

74S00

74S00	.32	74S124	2.75	74S197	1.49
74S02	.35	74S132	1.24	74S201	6.95
74S03	.35	74S133	.45	74S225	7.95
74S04	.35	74S134	.50	74S240	2.20
74S05	.35	74S135	.89	74S241	2.20
74S08	.35	74S138	.85	74S244	2.20
74S09	.40	74S139	.85	74S251	.95
74S10	.35	74S140	.55	74S253	.95
74S11	.35	74S151	.95	74S257	.95
74S15	.35	74S153	.95	74S258	.95
74S20	.35	74S157	.95	74S260	.79
74S22	.35	74S158	.95	74S273	2.45
74S30	.35	74S161	1.95	74S280	1.95
74S32	.40	74S162	1.95	74S287	1.90
74S37	.88	74S163	1.95	74S288	1.90
74S38	.85	74S168	3.95	74S289	6.89
74S40	.35	74S169	3.95	74S301	6.95
74S51	.35	74S174	.95	74S373	2.45
74S64	.40	74S175	.95	74S374	2.45
74S65	.40	74S181	3.95	74S387	1.95
74S74	.50	74S182	2.95	74S412	2.98
74S85	1.99	74S188	1.95	74S471	4.95
74S86	.50	74S189	6.95	74S472	4.95
74S112	.50	74S194	1.49	74S474	4.95
74S113	.50	74S195	1.49	74S570	2.95
74S114	.55	74S196	1.49	74S571	2.95

BYPASS CAPS

.01 UF DISC	100/6.00
.01 UF MONOLITHIC	100/12.00
.1 UF DISC	100/8.00
.1 UF MONOLITHIC	100/15.00

INTERFACE

8T26	1.59
8T28	1.89
8T95	.89
8T96	.89
8T97	.89
8T98	.89
DM8131	2.95
DP8304	2.29
DS8833	2.25
DS8835	1.99
DS8836	.99
DS8837	1.65
DS8838	1.30

**CONNECTORS**

RS232 Male	2.50
RS232 Female	3.25
RS232 Hood	1.25
S-100 ST	3.95

EXAR

XR 2206	3.75
XR 2207	3.75
XR 2208	3.75
XR 2211	5.25
XR 2240	3.25

INTERSIL

ICL7106	9.95
ICL7107	12.95
ICL7660	2.95
ICL8038	3.95
ICM7207A	5.59
ICM7208	15.95

9000

9316	1.00
9334	2.50
9368	3.95
9401	9.95
9601	.75
9602	1.50
96S02	1.95

VOLTAGE REGULATORS

7805T	.75	7905T	.85
78M05C	.35	7908T	.85
7808T	.75	7912T	.85
7812T	.75	7915T	.85
7815T	.75	7924T	.85
7824T	.75	7905K	1.49
7805K	1.39	7912K	1.49
7812K	1.39	7915K	1.49
7815K	1.39	7924K	1.49
7824K	1.39	79L05	.79
78L05	.69	79L12	.79
78L12	.69	79L15	.79
78L15	.69	LM323K	4.95
78H05K	9.95	UA78S40	1.95
78H12K	9.95		

C, T = TO-220 K = TO-3
L = TO-92**SOUND CHIPS**

76477	3.95	AY3-8910	12.95
76488	5.95	AY3-8912	12.95
76489	8.95	MC3340	1.49
		SSI-283	39.95

EPROM ERASERS
SPECTRONICS CORPORATION

Timer	Capacity Chip	Intensity (uW/Cm ²)	
PE-14	9	8,000	83.00
PE-14T	X	9	119.00
PE-24T	X	12	175.00
PL-265T	X	30	255.00
PR-125T	X	25	349.00
PR-320T	X	42	595.00

DATA ACQUISITION

ADC0800	15.55	DAC0800	4.95
ADC0804	3.49	DAC0808	2.95
DAC0806	1.95	DAC1020	8.25
ADC0809	4.49	DAC1022	5.95
ADC0816	14.95	MC1408L6	1.95
ADC0817	9.95	MC1408L8	2.95

LINEAR

LM301	.34	LM348	.99	LM567	.89	LM1812	8.25
LM301H	.79	LM350K	4.95	NE570	3.95	LM1830	3.50
LM307	.45	LM350T	4.60	NE571	2.95	LM1871	5.49
LM308	.69	LM358	.69	NE590	2.50	LM1872	5.49
LM308H	1.15	LM359	1.79	NE592	2.75	LM1877	3.25
LM309H	1.95	LM376	3.75	LM709	.59	LM1889	1.95
LM309K	1.25	LM377	1.95	LM710	.75	LM1896	1.75
LM310	1.75	LM378	2.50	LM711	.79	ULN2003	2.49
LM311	.64	LM379	4.50	LM723	.49	LM2877	2.05
LM311H	.89	LM380	.89	LM723H	.55	LM2878	2.25
LM312H	1.75	LM380N-8	1.10	LM733	.98	LM2900	.85
LM317K	3.95	LM381	1.60	LM741	.35	LM2901	1.00
LM317T	1.19	LM382	1.60	LM741N-14	.35	LM2917	2.95
LM318	1.49	LM383	1.95	LM741H	.40	LM3900	.59
LM318H	1.59	LM384	1.95	LM747	.69	LM3905	1.25
LM319H	1.90	LM386	.89	LM748	.59	LM3909	.98
LM319	1.25	LM387	1.40	LM1014	1.19	LM3911	2.25
LM320 (see 7900)	1.35	LM389	1.35	LM1303	1.95	LM3914	3.95
LM322	1.65	LM390	1.95	LM1310	1.49	LM3915	3.95
LM323K	4.95	LM392	.69	MC1330	1.69	LM3916	3.95
LM324	.59	LM393	1.29	MC1349	1.89	MC4024	3.95
LM329	.65	LM394H	4.60	MC1350	1.19	MC4044	4.50
LM331	3.95	LM399H	5.00	MC1358	1.69	RC4136	1.25
LM334	1.19	NE531	2.95	MC1372	6.95	RC4151	3.95
LM335	1.40	NE555	.34	LM1414	1.59	LM4250	1.75
LM336	1.75	NE556	.85	LM1458	.59	LM4500	3.25
LM337K	3.95	NE558	1.50	LM1488	.69	RC4558	.69
LM337T	1.95	NE561	24.95	LM1489	.69	LM13080	1.29
LM338K	6.95	NE564	2.95	LM1496	.85	LM13600	1.49
LM339	.99	LM565	.99	LM1558H	3.10	LM13700	1.49
LM340 (see 7800)	1.49	LM566	1.49	LM1800	2.37	MPQ2907	1.95

H = TO-5 CAN

T = TO-220

K = TO-3

RCA

CA 3023	2.75	CA 3082	1.65
CA 3039	1.29	CA 3083	1.55
CA 3046	1.25	CA 3086	.80
CA 3059	2.90	CA 3089	2.99
CA 3060	2.90	CA 3096	3.49
CA 3065	1.75	CA 3130	1.30
CA 3080	1.10	CA 3140	1.15
CA 3081	1.65	CA 3146	1.85
CA 3160	1.19		

TI

TL494	4.20	75365	1.95
TL496	1.65	75450	.59
TL497	3.25	75451	.39
75107	1.49	75452	.39
75110	1.95	75453	.39
75150	1.95	75454	.39
75154	1.95	75491	.79
75188	1.25	75492	.79
75189	1.25	75493	.89
75494	.89		

BI FET

TL071	.79	TL084	2.19
TL072	1.19	LF347	2.19
TL074	2.19	LF351	.60
TL081	.79	LF353	1.00
TL082	1.19	LF355	1.10
TL083	1.19	LF356	1.10
LF357	1.40		

2764 8K x 8 EPROM \$6⁹⁵ **27128-30** 16K x 8 EPROM \$29⁹⁵
450 ns 300 ns

BARGAIN HUNTERS CORNER

2732A 350ns

• "A" VERSION PROGRAMS AT 21 VOLTS.

• FAST 350ns ACCESS TIME

4.95 EACH **100/4.45** EACH

Z-80 SPECIALS

Z-80A-CPU 2.95
Z-80A-CTC 2.95
Z-80A-PIO 2.95

SPECIALS END 7/31/84

TRANSISTORS

2N918	.50	MPS3708	.15
MPS918	.25	2N3772	1.85
2N2102	.75	2N3903	.25
2N2218	.50	2N3904	.10
2N2218A	.50	2N3906	.10
2N2219	.50	2N4122	.25
2N2219A	.50	2N4123	.25
2N2222	.25	2N4249	.25
PN2222	.10	2N4304	.75
MPS2369	.25	2N4401	.25
2N2484	.25	2N4402	.25
2N2905	.50	2N4403	.25
2N2907	.25	2N4857	1.00
PN2907	.125	PN4918	.25
2N3055	.79	2N5088	.25
3055T	.69	PN5129	.25
2N3393	.30	PN5139	.25
2N3414	.25	2N5209	.25
2N3563	.40	2N6028	.35
2N3565	.40	2N6043	1.75
PN3565	.25	2N6045	1.75
MPS3638	.25	MPS-A05	.25
MPS3640	.25	MPS-A06	.25
PN3643	.25	MPS-A55	.25
PN3644	.25	TIP29	.65
MPS3704	.15	TIP31	.75
		TIP32	.79

IC SOCKETS

1-99	100
8 pin ST	.13 .11
14 pin ST	.15 .12
16 pin ST	.17 .13
18 pin ST	.20 .18
20 pin ST	.29 .27
22 pin ST	.30 .27
24 pin ST	.30 .27
28 pin ST	.40 .32
40 pin ST	.49 .39
64 pin ST	4.25 call

ST = SOLDER TAIL

8 pin WW	.59 .49
14 pin WW	.69 .52
16 pin WW	.89 .58
18 pin WW	.99 .90
20 pin WW	1.09 .98
22 pin WW	1.39 1.28
24 pin WW	1.49 1.35
28 pin WW	1.69 1.49
40 pin WW	1.99 1.80

WW = WIREWRAP.

RF MODULATOR

(ASTEC UM1082) QUANTITIES LIMITED

- ★ PRESET TO CHANNEL 3
- ★ USE TO BUILD TV-COMPUTER INTERFACE
- ★ +5 VOLT OPERATION

NOW ONLY \$6⁹⁵

LED LAMPS

1-99	100-up
JUMBO RED	.10 .09
JUMBO GREEN	.18 .15
JUMBO YELLOW	.18 .15
LED MOUNTING HARDWARE	.10 .09

LED DISPLAYS

HP 5082-7760	.43"	CC	1.29
MAN 72	.3"	CA	.99
MAN 74	.3"	CC	.99
FND-357 (359)	.375"	CC	1.25
FND-500 (503)	.5"	CC	1.49
FND-507 (510)	.5"	CA	1.49
TIL-311 4x7	.270"	HEX W/LOGIC	9.95

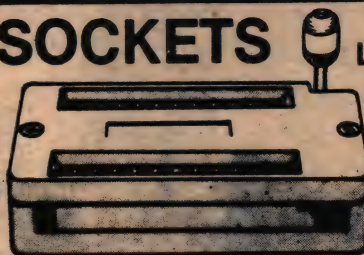
DIP

SWITCHES

4 POSITION	.85
5 POSITION	.90
6 POSITION	.90
7 POSITION	.95
8 POSITION	.95

ZIF SOCKETS

ZIF =
Zero
Insertion
Force



LEADS UNIT PRICE

14	5.95
16	5.95
24	7.95
28	8.95
40	10.95

OPTO-ISOLATORS

4N26	1.00	MCA-7	4.25
4N27	1.10	MCA-255	1.75
4N28	.69	IL-1	1.25
4N33	1.75	ILA-30	1.25
4N35	1.25	ILQ-74	2.75
4N37	1.25	H11C5	1.25
MCT-2	1.00	TIL-111	1.00
MCT-6	1.50	TIL-113	1.75

RESISTORS

1/4 WATT 5% CARBON FILM
ALL STANDARD VALUES
FROM 1 OHM TO 10 MEG OHM

50 PCS. SAME VALUE	.025
100 PCS. SAME VALUE	.02
1000 PCS. SAME VALUE	.015

BYPASS CAPS

.01 UF DISC	100/6.00
.01 UF MONOLITHIC	100/12.00
.1 UF DISC	100/8.00
.1 UF MONOLITHIC	100/15.00

DIODES

1N751	5.1 volt zener	.25
1N759	12.0 volt zener	.25
1N4148	(1N914) switching	25/1.00
1N4004	400PIV rectifier	10/1.00
KBP02	200PIV 1.5amp bridge	.45
KBP04	400PIV 1.5amp bridge	.55
VM48	Dip-Bridge	.35

MUFFIN FANS

4.68" Square	14.95
3.125" Square	14.95

HEAT SINKS

TO-3 style	.95
TO-220 style	.35

SWITCHES

SPDT mini-toggle	1.25
DPDT mini-toggle	1.50
SPST mini-pushbutton	.39

CAPACITORS

TANTALUM

	6V	10V	15V	20V	25V	35V
.22uf						.40
.27						.40
.33						.40
.47			.35			.50
.68						.45
1.0		.40	.40	.45		.45
1.5			.45			.50
1.8						.75
2.2		.35	.40	.45		.65
2.7		.40	.45			.90
3.3		.45	.50	.55	.60	.65
3.9		.45				
4.7	.45	.55		.60	.65	.85
6.8			.70		.75	
10	.55	.65	.80	.85	.90	1.00
12	.65		.85	.90		
15	.75	.85	.90			
18			1.25			
22		1.00	1.35			
27			2.25			
39			1.50			
47	1.35					
56	1.75					
100		3.25				
270		3.75				

DISC

10pf	50V .05	470	50V .05
22	50V .05	560	50V .05
25	50V .05	680	50V .05
27	50V .05	820	50V .05
33	50V .05	.001uf	50V .05
47	50V .05	.0015	50V .05
56	50V .05	.0022	50V .05
68	50V .05	.005	50V .05
82	50V .05	.01	50V .07
100	50V .05	.02	50V .07
220	50V .05	.05	50V .07
330	50V .05	.1	12V .10
		.1	50V .12

MONOLITHIC

.1uf-mono	50V .18	.47uf-mono	50V .25
.047uf-mono	50V .15	.01uf-mono	50V .14

ELECTROLYTIC

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.47uf	50V .14	1uf	50V .14
1	25V .14	4.7	16V .14
2.2	35V .15	10	16V .14
4.7	50V .15	10	50V .16
10	50V .15	22	16V .14
47	35V .18	47	50V .20
100	16V .18	100	15V .20
220	35V .20	100	35V .25
470	25V .30	150	25V .25
2200	16V .60	220	25V .30
		330	16V .40
		550	16V .42
		1000	16V .60
		1500	16V .70
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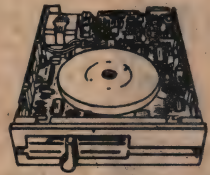
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RIBBON CABLE DIP PLUGS (IDC)	IDPxx	---	1.45	1.65	---	---	---	2.50	---	4.15

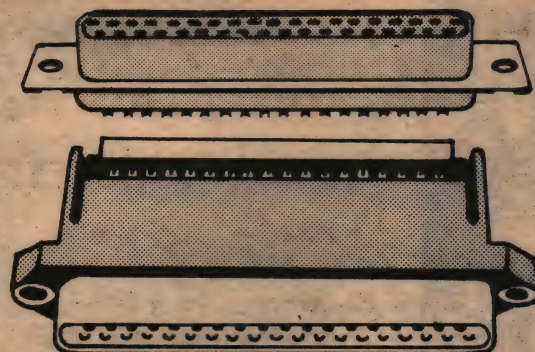
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	FEMALE DBxxS	2.66	3.63	3.25	7.11	9.24
RT. ANGLE	MALE DBxxPR	1.65	2.20	3.00	4.83	---
	FEMALE DBxxSR	2.18	3.03	4.42	6.19	---
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	FEMALE IDBxxS	3.69	5.13	6.84	10.08	---
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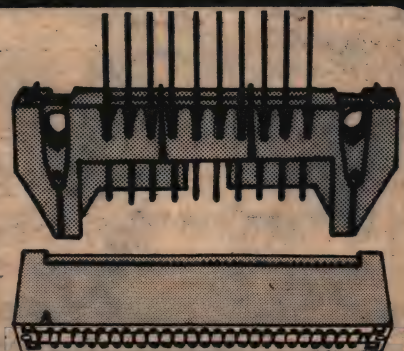
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		10	20	26	34	40	50
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WW HEADER	IDHxxW	1.86	2.98	3.84	4.50	5.28	6.63
RT. ANGLE WW HEADER	IDHxxWR	2.05	3.28	4.22	4.45	4.80	7.30
RIBBON HEADER SOCKET	IDSxx	1.15	1.86	2.43	3.15	3.73	4.65
RIBBON HEADER	IDMxx	---	5.50	6.25	7.00	7.50	8.50
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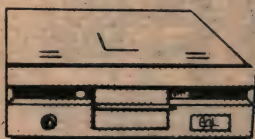
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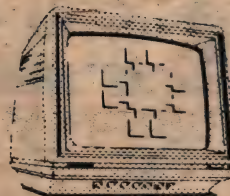
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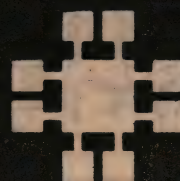
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Innermost Secrets Continued from page 103

name, the entry point and the device name. The first word in the device/linkage chain will have a zero at the end of all the devices; in this case you can see the end of the chain at >4060; try following the device/linkage entries and identify the entry addresses, the next entry chains and the lengths and the device names.

At locations >400A and >400C are the vectors that point to the interrupt routine in the DSR; in the case of the RS232 DSR these addresses point to the start of the interrupt routine at >40D2 (remember, the first word of the entry vectors is >0000). Like the power-up sequence, if the entry words are all zeroes, this indicates that the particular feature is not implemented. Here we're lucky as we have both a power-up routine and an interrupt routine to hack at.

First, the power-up sequence. On power-up, the console operating system will check each and every device to see if the device needs to be pre-initialized before being used in the system. Let's examine what happens in the RS232's power-up sequence. First, we go to the power-up vector and fetch the location to start, which points us to >40F4. Control is turned over to >40F4 and we start executing code. First thing that is done is we save the previous R12 value into a temporary register. We need to do this to prevent the DSRLNK routine from trying to shut the DSR off with a bad R12 value; if the original R12 value is NOT restored when we leave the DSR, the system will likely fail. Once saved, we then do an SBO 7, then an SBO 2, followed by an SBZ 1. The SBO 7 turns on the DSR LED on the peripheral, indicating that it is in use. The SBO 2 and the SBZ 1 are used by the PIO circuitry to tell the PIO to reset it. (In the CorComp RS232 DSR the PIO is implemented as a TMS 9901 PSI chip; this code does not hold true for this card.)

The next 2 sets of instructions are used to reset the TMS 9902 Asynchronous Communication Controller chips used by the RS232 interface. Each chip has extensive logic and is capable of doing a whole slew of things: it has its own built-in baud rate generator and an interval timer, all packaged in a 18-pin package. Unlike most other devices that are memory-mapped, the TMS 9902 uses the CRU logic for its interfacing making it easy to access

and program the device. However, the TMS 9902 is an article in itself, but we will mention particulars of the device as we examine the code. If you are really interested in the device, contact your TI Semiconductor representative and ask for the data sheets on the TMS 9902 (NOT the Consumer Products division!) Doing the AI R12,>40 sets up the base addresses for all CRU ac-

tivity for the first 9902 device. The SBO 31 instruction resets all the internal registers of the 9902. The next instruction AI R12,>40 sets up for the next SBO 31, which resets the second 9902. Finally, R12 is restored, Bit 7 is turned off and we exit the power-up routine via a B *R11. You must exit the DSR with a B *R11.

The interrupt routine is

somewhat similar in that when an interrupt is fired, the console must determine who fired the interrupt. To determine this the console ROM will interrogate all peripherals and check for the presence of an interrupt vector; if one is found, then control is turned over to the interrupt routine for processing. In this DSR an interrupt occurs upon receipt of a

character, so in this case control is turned over to >40D2. First it stores the WP in R4 (though the disassembler doesn't show it; this is a problem due to an instruction that couldn't be translated at >40CA). The DSR light is

Continued on page 110

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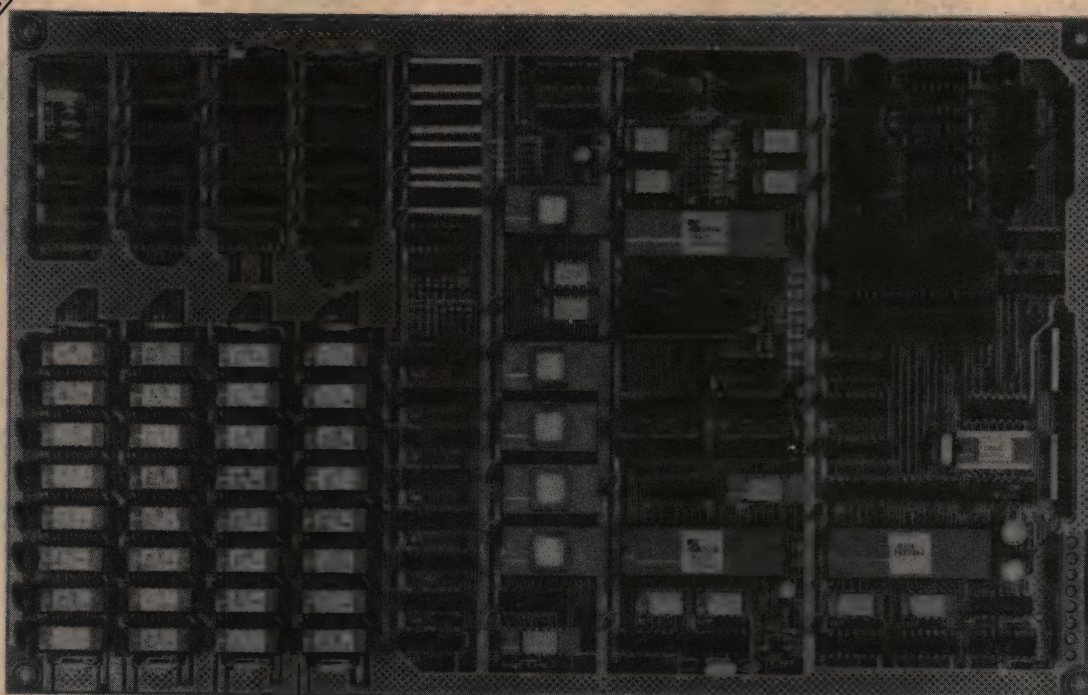
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Innermost Secrets Continued from page 109

turned on, then both R11 and R12 are backed up. The first 9902 is tested for receipt of a character (TB 16) and if true, the processor jumps to >410E where it BL to the routine at >4874. If it fails the receive interrupt test, it checks to see if a data set change, a timer interrupt or a transmitter interrupt has occurred; if one has, then it drops through to the power-up routine; this indicates that the DSR ran into an interrupt condition it shouldn't have and resets the ACC in question. The same procedure also applies to the second 9902 with the exception that if the device fails the tests, it sets the receive interrupt enable on the second 9902 and then branches out of the interrupt routine via *R5—note that this is OK as the contents of R11 were moved to R5.

Now comes the rough part and that's the main body of the code. To try to explain what all this 2+K of code does in this article would run on forever. It's not that I'm skirting the issue; it's just that this is a LOT of material to digest and unfortunately, it is difficult to do in this kind of media. However, I will pass along some information that you should find useful in exploring the innards of this code; and if you find something real novel in this code, let people know. Here are some hints to help you along.

(1)DSRLNK places the PAB in the CPU RAM memory for

operations before the operation and places the PAB back out in VDP RAM when the operation completes. This appears to be the case as you may notice that many of the operands in the disassembly point to a negative displacement off of R4 which makes it point to CPU RAM, most notably the PAB definitions and some scratchpad workspace used by the DSR.

(2) There is a switch table starting at >4076 and running thru >4098 which contains the two byte character representation of the switch value and an address that immediately

follows the switch literal; also from >40A6 thru >40B2 is a table with the binary values for the baud rate which is used by the DSR to determine the value to program into the shift register to set the baud rate of the 9902. The initialization of the control register is done between locations >482C thru >4840.

(3) Useful TB instructions to look for are TB 27 (data set ready test bit), TB 21 (receive buffer loaded), TB 9 (receive error) and TB 22 (wait for transmitter shift register to empty). Some SBZ instructions

to look for are SBZ 18 which resets the receive buffer register and SBZ 16 which shuts the transmitter off. SBO 16 turns on the transmitter on the 9902. Take a look at the code between >47DE and >4806 for some of the logic used by these instructions as well as >4650 and >4668.

I hope this has helped you to start to understand some of the innermost workings that go on inside your 99/4A; and even though the article series was intended to give you the deep dark secrets, we have just barely scratched the surface of the

capabilities of this machine. If there are some issues that we left out, it wasn't intentional. It was either that no one asked for them or we just simply don't know enough about them to make inroads. I hope that as time goes on there will be other individuals who will tear into the machine the way we have in the past several months and share their insights; for this is the ONLY way we will be able to continue to get the most out of our systems. This isn't the end of the line by any means...just keep reading and DOING!

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F144-G	2.69
F145-G	2.69
F147-G	2.69
M11A-G	1.34
M11AB-G	1.14
M41A-G	1.34
M13A-G	1.59
M13AB-G	1.39
M18A-G	2.59
M43A-G	1.59
M14A-G	2.09
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Wang Adds Two New VS 85 Packages To Family Of 32-Bit Systems

Extending the range of powerful 32-bit computer configurations available to the small - and medium-sized office, Wang Laboratories, Inc., has announced two new packaged VS 85 configurations. Featuring an internal disk drive, the new models -- VS 85-76F and VS 85-147F --

offer the processing power of a 32-bit CPU, as well as extensive storage capabilities, in a compact unit designed specifically for the office environment.

"The new SX 85 packaged systems reflect our strategy of combining the power of the VS 100 CPU and architecture with

attractive packaging to provide a powerful, yet affordable entry-level high-end system that meets the information processing needs of departments and smaller companies," said Samuel F. Gagliano, vice president of product marketing. "With these new preconfigured systems, small- and

mid-size organizations can enjoy the benefits of a high-performance superminicomputer at a lower cost than if the components were purchased separately."

Each basic package consists of the following: a model VS 85-1, which includes 1MB of main memory, a 16-port serial

input/output processor, an archiving workstation, a bus adapter, the VS operating system, and Assembler; a disk input/output processor that supports two disk drives of any combination and their disk switch options; a communications input/output processor supporting three data link processors; and a compiler.

In addition, the VS 85-76F includes the 76MB eight-inch internal fixed disk drive currently available on the VS 25 and 45. The VS 85-147F is configured with a new 147MB eight-inch fixed disk drive. Each disk drive is housed in the VS 85 cabinet.

"With the new VS 85 packages we offer more flexibility in packaged configurations at a lower entry price," said James A. Risher, vice president of U.S. marketing. "For the first-time user, our preconfigured VS 85 systems provide an attractive introduction to a family of powerful 32-bit computers. To current users of Wang VS 45 systems, the VS 85 packages offer a smooth, cost-effective growth path to superminicomputer processing. Since all systems in the VS family are fully compatible, VS 45 users can upgrade to a VS 85 package without costly rewriting of programs."

The packaged VS 85 systems are designed for offices that require the processing capabilities of the VS 100 for up to 64 users. Because the disk drives are built into the cabinets, the systems are particularly easy to install. They also do not require special adjustments in the office environment.

Each VS 85 package can be configured with local and remote workstations to support a combination of data processing and office automation applications. Backup devices may be added depending on individual user requirements.

The new VS 85 configurations can expand along with the users' growing needs. Users may upgrade their system from the entry-level basic configuration to a medium-sized system with cache memory that can support more peripherals and a larger number of tasks and applications.

The systems are priced at \$70,000 for the VS 85-76F and \$77,000 for the VS 85-147F. They will be available in June 1984.

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3481-G	2.59
3501-G	3.49
6100-G	3.74

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52402-G	2.69
52401-G	2.64
52801-G	3.54

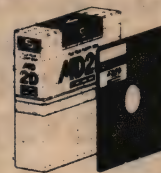
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802067-G	4.29

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Randy's Ramblings

by Randy Holcomb

This month's column ought to be called Randy's ramblings for we'll be covering a little bit of everything this month.

First off, THANK YOU ALL for the letters you have sent to me. For those of you who haven't gotten a reply back I'm sorry, but I'm getting around to answering all the letters now. Many of you who wrote to me were asking some specific questions, so at this time we would like to announce that, starting in the next issue, we will have a new feature section designed to answer your questions on the TI line. Just send your questions to

TI Questions and Answers
c/o Computer Shopper
PO Box F

Titusville, FL 32781

and we will do our best to try to answer both specific and general questions and publish them here.

I forgot to send in the small Pascal program to be published in the May issue. Well, this will be rectified NOW. This pro-

gram will back up ANY disk, either single or double sided, and with only one drive (if necessary), and will even back up those disks that have the copy protection on them (to make backup copies of your OWN disks, naturally; no pirating please). It uses the UCSD procedures UNITREAD and UNITWRITE to read and write sectors from the disk. The program will ask you for the source and destination disks and the size of the disk you are backing up.

Speaking of Pascal, those of you who have the p-system utilities disk and are thinking of getting a utility like Navarone Industries Disk Fixer™, think again. By specifying a unit name for the file to be processed (as opposed to giving a file name) the PATCH Program on the p-system utilities diskette will allow you to read and write any sector on the disk; but keep in mind that PATCH reads in 512 bytes at a time (1 block in the p-system) versus Disk Fixer's 1 sector, which is 256 bytes (1 p-system

block is equal to 2 TI sectors). Plus, PATCH will display the data in hex, decimal, octal or ASCII format on the display or on hardcopy as well. Of course, those of you who don't have the p-system will still find Disk-Fixer a useful tool to have for recovering blown directories, patching files and the like. It has been re-released in cartridge form and costs \$34.95; check your local dealer. A "SuperZap"-like utility no one should be without.

TI is no longer selling any TI 99/4A products. As of April, TI sold all remaining inventory to a new marketing outfit called Triton Marketing, which will be responsible for distribution of remaining TI inventory and may possibly manufacture products for the TI 99/4A. To request a catalog from Triton, call 1-800-227-6900 (CA: 1-800-632-4777).

On the TI Professional front, it appears that TI is aiming their guns straight at IBM. TI has launched a new ad campaign called "Dare To Compare," where an IBM and TI

are placed side by side to show the superiority of the TI PC over the IBM PC in its graphics, speed, keyboard and price. The demo also shows off some of the most popular IBM PC packages running with the TI counterpart, such as Lotus 1-2-3 to demonstrate the TI PC's features. However, there have been persistent rumors of many dealers dropping the TI PC for fear of what happened with the /4A will also happen to the TI PC. (I have been told by one individual that, in his metropolitan area which has over 1 million people, the nearest TI dealer is over 80 miles away!)

CorComp has begun shipment of their Standalone RS232 peripheral which can be expanded to include 32k expansion memory and a double-sided double-density disk con-

troller. The price for the Standalone RS232 unit is \$149, with the 32K and disk upgrade cards following soon. CorComp's DS/DD disk controller card for the Peripheral expansion system has been the latest piece of gear that has had the throngs of TI users chomping at the bit. So far it has missed several scheduled release dates and has been pegged at being released near the end of May. It was also heard that Craig Miller, of Millers Graphics

Continued on page 113

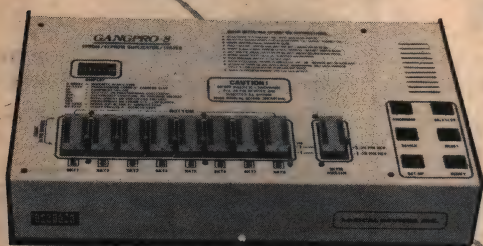
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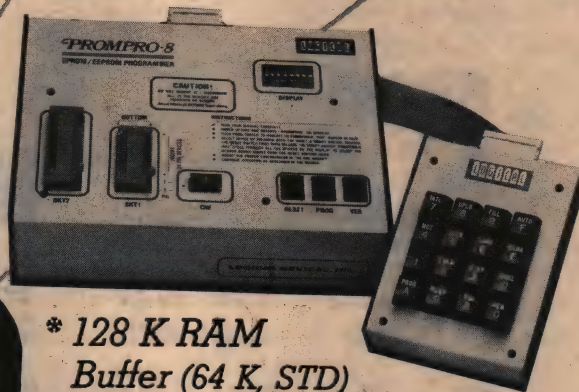
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Randy's Ramblings

Continued from page 112

fame, is now acting CEO of CorComp. What this means we aren't sure yet.

Myarc, which makes the TI99/4A Winchester drive for the TI 99/4A is reported to be starting shipment of their Expansion System with a price of around \$500-\$600. The initial units are reported to be the size of a shoebox and plugs right into the side of your console (shades of the old freight train peripherals!) but we have been told that they will come out with a cable assembly that will allow the expansion system to be placed anywhere. The specs on Myarc's box: 32K expansion memory, 1 RS232 port, 1 parallel port, DS/DD disk controller, 1 half-height single sided floppy that holds 180K (remember, it uses a DSDD disk card) with room for another half-height drive. Myarc has had great success with their Winchester based system in South America and does have production facilities, so talk to your dealers about the Myarc and the CorComp. As always, whenever new products come out, count on Computer Shopper for an IN DEPTH review.

CompuServe has announced that a new User Forum is available to subscribers for their service, called the TI Forum. The TI Forum is an online facility which allows people from all over the country to leave and retrieve messages of interest about TI systems and software, and has a Reference Library available for all members to access, as well as being able to download programs from the system to your TI. The Forum coordinators are Jim Horn, who is a frequent contributor to the Computer Shopper and is President of one of the largest TI user's groups in the country (DC TI user's group); Steve Davis, author of Programs for the TI Home Computer and

publisher of the Professional Computer News for the TI Professional, (and yours truly). To join the TI Forum, you need a CompuServe account. The TI Forum can be found on page PCS-27 in the menu system.

On the entertainment front, Atarisoft has released Moon Patrol, Jungle Hunt and Ms. Pac Man; Imagic has released Fathom and MoonSweeper, and Infocom has released all 3

Zorks, Deadline, Starcross, Suspended, Infidel, Planetfall and a few others I forgot, but it's nice to see a major third party software house release some very popular software for the 99/4A.

MBX Is Alive! Even though production was cut short, a major shipment of MBX systems has hit dealers' shelves as well as software that takes advantage of the speech recognition inside the MBX. I

will be acquiring an MBX box and will tear into it and let you all in on the capabilities of this wondrous device.

Attention Users Groups! If you haven't sent in your name here to be published in the Computer Shopper, please DO SO! I have a good sized list now (courtesy Jim Peterson of Tigercub Software) but I've got a feeling there're more users groups than that. Also, I encourage users groups to talk to other users groups to find out how the software situation is in your area and to assist new groups just getting off the ground.

Final note: This month marks the end of the Innermost Secrets article series but this does not mark the end of MORE things to come. The article series just scratched the surface! For those people who were unable to catch the series, arrangements are being made to reprint the series as a booklet; watch for its announcement! And, of course, we will continue to bring reviews and a look at the TI that nobody else can. I have a good sized list of future article topics but if you have a topic that is really interesting, send it in!

```
{ $L PRINTER: }
Program fastback:
var
  buffer:array[1..5120] of integer;
  inunit,outunit:integer;
  blkbase,blklimit:integer;
  ch:string[9];

Procedure getfrom;
begin
  inunit:=0;
  while (inunit <>4) and (inunit <>5) and (inunit <>9) do
  begin
    write('Enter Source Drive # (4,5,9) ?');
    readln(inunit);
  end;
  blkbase:=0;
  while (blkbase <>180) and (blkbase <>360) do
  begin
    write('# blocks to copy (180/360) ?');
    readln(blkbase);
  end;
  blklimit:=(blkbase div 10) - 1;
end;

Procedure setto;
begin
  outunit:=0;
  while (outunit <>4) and (outunit <>5) and (outunit <>9) do
  begin
    write('Enter Copy Drive # (4,5,9) ?');
    readln(outunit);
  end;
end;
begin
  writeln('FASTBACK [V1.0]');
  getfrom;
  setto;
  writeln('Insert disks--<CR> to start');
  readln(ch);
  for blkbase:=0 to blklimit do
  begin
    if inunit=outunit then
    begin
      write('Insert MASTER disk--Press <CR> when ready');
      readln(ch);
    end;
    unitread(inunit,buffer,5120,blkbase*10);
    if inunit=outunit then
    begin
      write('Insert COPY disk--Press <CR> when ready');
      readln(ch);
    end;
    unitwrite(outunit,buffer,5120,blkbase*10);
  end;
  writeln('Copy Complete.')
```

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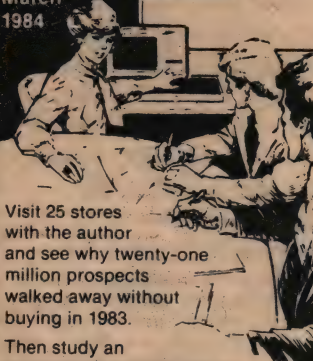
by Kevin Lillard

Here are some answers to your questions about downloading text from BBS's to your TI-99/4A. Also, I'll pass along a short Extended BASIC utility program called CHANGE, which can be used with the TI-WRITER word processor and Terminal Emulator II (we call it TEII for short) to upload messages

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A Guide to Retail Success

written with TI-WRITER to Source's PARTI and POST.

First, TEII. It allows you to copy a "page" of data to another port device using the Control-2 command. Remember that a page can either be from 34 to 40 characters wide, or 80 characters wide, although you can see only a 40-character "window" in that mode. If you are copying to a disk drive, you have to leave TEII with the Control-Zero command, or your file is lost. (More experienced TI users will know there are a couple of ways to retrieve this data, but that's for another story.)

TEII files are saved on disk in Display/Fixed 80 format. These files can be directly loaded into TI-WRITER (on which this is being written) and edited from there. TI-WRITER saves files in Display/Variable 80 format. And, TEII's "auto-logon" function accepts files in Display/Variable 80 format. Put these together, and you have the combination that will allow you to upload a text file using the two programs.

Page 28 of the TEII manual has an odd explanation about hex bytes and so forth. Forget that. Here's what you need in a TEII logon file:

--In front of each line of data, you need to stick the character "1".

--Then, if you want to delay sending the next line, put in a line that is made of the character "2", and another character that tells TEII how long the delay should be. (This next part gets a little complicated.) The module figures the delay by dividing by 60 the ASCII number of the character that follows the "2". For example, a small "x" has an ASCII number of 120, so TEII will wait for two seconds before it feeds the next line of text.

Now, here's the listing of the CHANGE program, written in Extended Basic, to be used with TI-WRITER:

```
100 CALL CLEAR
120 INPUT "Name of file to be converted: ";F$
140 OPEN #2: "DSK1." + F$ + ".C"
160 OPEN #1: "DSK1." + F$ + ".INPUT.DISPLAY.VARIABLE
80
180 PRINT "Converting line number";
200 X = 1
220 LINPUT #1:A$
240 IF EOF(1) = 1 THEN 380
260 A$ = "1" + A$ + CHR$(13)
280 PRINT X;
300 PRINT #2:A$
320 PRINT #2:"2" + CHR$(120)
340 X = X + 1
360 GOTO 220
380 CLOSE #1
400 CLOSE #2
420 PRINT "Conversion complete"
440 END
```

Here's the explanation of the CHANGE listing:

LINE 120 Prompts the user to type in the name of the file (minus the "DSK1." the computer needs.) The space is because of the 28-column TI format.

LINE 140 opens the duplicate file, with the first filename, plus a "C".

LINE 160 opens the original text file.

LINE 180 lets you know the file was found.

LINE 200 sets up a variable for the line count to be shown on the screen.

Line 220 gets each line of the text file. "LINPUT" exists only in Extended BASIC. Standard "INPUT" ends the line when a comma is found.

LINE 240 tells the program when to end.

LINE 260 changes the text line so it can be read by TEII, adding the "1" at the beginning. At the end, "CHR\$(13)" is a carriage return character, needed so the remote system will know the end of the line has been reached.

LINE 280 prints the number of the line being processed on the screen.

LINE 300 stores the converted text line in the duplicate disk file.

LINE 320 places the characters "2x" in the duplicate file. "2" tells TEII to wait, and "x" tells it to wait for two seconds.

Line 340 increments the line count, and LINE 360 sends the program to the line to check if the end of the original file has been reached.

LINE 380 and LINE 400 close the disk files.

LINE 420 tells the user the duplicate file has been finished.

Here's the way it all goes together:

If you see a file from another system you wish to copy, use the control-2 command. Remember to use Control-Zero to close the disk file properly.

Load the file into TI-WRITER and edit as you wish. IMPORTANT: Set the right margin to 76. If you have a line that's longer than 77 characters, the CHANGE program will make the line too

long for TEII to use. Also, keep your file name short, no more than four characters.

When you finish editing, run CHANGE and make the duplicate file. If the original file is named TEST, the duplicate file will be named TESTC.

When you're ready to feed the file down to another system, go to the auto-logon screen of TEII, and type in the duplicate file name. The file will scroll out, line by line, with two seconds between lines.

NOTE: If you use the "enter" key in TI-WRITER to end a line, add this line to CHANGE:

```
250 IF SEG$(A$,LEN(A$),1) = CHR$(13) THEN A$ = SEG$(A$,1,LEN(A$) - 1)
```

This will log the c/r off the end of the line. Some systems recognize two consecutive c/r's as a sign you've finished uploading your file.

Terminal Emulator II, the main terminal program for the TI-99/4A, will respond to most of the standard ASCII screen format codes. However, there are additional codes which will allow you to make these machines change screen colors and talk (if the 99 4a has an attached Speech Synthesizer).

There are two or three ways to run these codes. You can use the keyboard, use TI-WRITER, or use the CHR\$ function in TI BASIC. For this explanation, we'll start by using ASCII numbers in decimal form. We'll also show you how to use the TEII and TI-WRITER keyboards to do the same thing. Remember that TI-WRITER has a Special Character Mode that allows you to type in "invisible" control characters. Type in a Control-U to go to that mode.

First, the most basic codes (which should work anywhere, by the way).

ASCII 1 will place the cursor at the upper left hand corner of the screen, its HOME position. Use Control-A in TEII, and CHR\$(1) in BASIC. In TI-WRITER, it's Shift-A in special mode.

ASCII 12 does the same thing, but also clears the screen. Control-L in TEII, CHR\$ in BASIC, Shift-L in TI-WRITER special mode.

ASCII 7 is the old teletype BELL command. It will produce a beep from your

Continued on page 115

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Tutorial Continued from page 114

monitor. Control-G in TEII, CHR\$(7) in BASIC, Shift-G in TI-WRITER special mode.

To change TEII screen colors, you start with the "Extended Write." That's the way TI describes the series of characters you have to give to the software so it will carry out a command. The extended write starts with these ASCII characters:

/27/71/127/27/40/

--and ends with these:

/27/41/

Let's explain what those numbers mean. The "27" represents ASCII character number 27, called the "ESCAPE" character. The "71" is ASCII character

number 71, a capital "G". This follows for all the numbers in this list.

After the "40", you put a character to tell TEII what you want to do, then a character to represent the color letters you want, and another character for the screen color you want.

To change your screen colors, first you need this list of color codes:

- 32--Transparent
- 33--Black
- 34--Medium Green
- 35--Light Green
- 36--Dark Blue
- 37--Light Blue
- 38--Dark Red
- 39--Cyan
- 40--Medium Red
- 41--Light Red
- 42--Dark Yellow
- 43--Light Yellow
- 44--Dark Green
- 45--Magenta

- 46--Gray
- 47--White

&CHR\$(40)&CHR\$(43)&CHR\$(47)&CHR\$(36)&CHR\$(27)&CHR\$(41)
120 PRINT #1:
130 CLOSE #1

To set screen colors with Terminal Emulator II, you need to send the right series of characters. Let's say you want to have white letters on a dark blue screen. Here's the extended write you need:

/27/71/127/27/40/43/47/36/27/41/

There are three ways to do this. For this example, let's say you're setting up a file to automatically change screen color each time you log on to The Source. First, using a BASIC program!

When you get the "=>" Source Prompt, type "ENTER TEST", and when the system tells you to "Enter text:", leave TEII, go to BASIC, and run the following program:

100 OPEN #1:"RS232"
110 PRINT
#1:CHR\$(27)&CHR\$(71)&CHR\$(127)&CHR\$(27)

Then, go back to TEII, type "TY TEST", and your screen will change colors. To have your screen change colors automatically on logon, enter a C_ID file that consists of the command "TY TEST", and you'll have a white-on-blue screen every time you're on The Source.

The second way: in TEII, type these characters:

```
240 IF POS(CO$(X)," ") >= 0  
THEN CS(X) = "1"&CHR$(ASC  
(SEG$(CO$(X)," ",1  
2)) - 64)  
&CHR$(13) ELSE AC$(X) = "1"&  
CO$(X) & CHR$(13)
```

Continued on page 116

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```
260 IF COS(X)="CR" THEN AC$(X)
=1"&CHR$(13)
280 COS(X)=COS(X)&RPT$( "
20-LEN(COS(X)))&" " &"C"
300 IF QW$="N" THEN GOTO 640
320 DISPLAY AT(7,1)BEEP:"Type
-- 1 for another command":2
for a time delay":3 to check and
store your logon file"
340 ACCEPT AT(10,26)BEEP
VALIDATE(DIGIT):AA
360 IF AA>3 THEN 340
380 ON AA GOTO 400,420,640
400 X=X+1 :: HOLD=HOLD+1
```

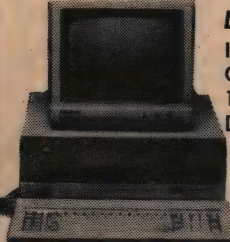
```
:: GOTO 220
420 DISPLAY AT(1,1)ERASE
ALL:"An individual delay can be up
to 4.2 seconds in length. How long
do you want this delay to last?"
440 ACCEPT AT(4,21)BEEP
VALIDATE(NUMERIC):BB
460 IF BB>4.2 THEN 440
480 IF QW$="N" THEN 500 ELSE
X=X+1 :: HOLD=HOLD+1
500 AC$(X)="2"&CHR$(INT(BB))
&CHR$(13):: COS(X)=STR$(BB)&"
second delay"
520 COS(X)=COS(X)&RPT$( "
20-LEN(COS(X)))&" " &"D"
540 IF QW$="N" THEN 640 560
DISPLAY AT(6,1):"Type-- 1 for
another command 2 for a time delay
3 to check and store your logon file"
```

```
580 ACCEPT AT(9,26)BEEP
VALIDATE(DIGIT):AA
600 IF AA>3 THEN 580
620 ON AA GOTO 400,420,640
640 DISPLAY AT(1,1)ERASE
ALL:"Here are the contents of your
logon file:"
660 FOR TT=1 TO HOLD
680 DISPLAY AT(TT+3,1):TT,
COS(TT)
700 NEXT TT
720 DISPLAY AT(TT+4,1)BEEP:"Is
this correct?"
740 ACCEPT AT(TT+4,18)BEEP
VALIDATE("YN"):QW$
760 IF QW$="N" THEN DISPLAY
AT(TT+4,1)BEEP:"Which one do
you wish to correct? " :: GOTO 860
ELSE 780
```

```
780 DISPLAY AT(TT+4,1)BEEP:
"Type-- 1 for another command
2 for a time delay 3 to store the file"
800 ACCEPT AT(TT+7,28)BEEP
VALIDATE(DIGIT):AA
820 IF AA>3 THEN 800
840 ON AA GOTO 400,420,920
860 ACCEPT AT(TT+5,9)BEEP
VALIDATE(DIGIT):COR
880 HOLD=X :: X=COR
900 IF POS(COS(X)," C".1)=0
THEN 420 ELSE 220
920 DISPLAY AT(1,1)ERASE ALL:
"Type in the name for your logon
file:"
940 ACCEPT AT(2,13)VALIDATE
(UALPHA,"1234567890")BEEP
SIZE(5):FILES
960 OPEN
#1:"DSK1,"&FILES,DISPLAY
VARIABLE 80
980 FOR FF=1 TO HOLD
1000 DISPLAY AT(3+FF,1):COS
(FF):: PRINT #1:AC$(FF)
1020 NEXT FF
```

```
1040 CLOSE #1
1060 DISPLAY AT(23,1):"All done!
Goodbye!"
1080 END
1100 DISPLAY AT(1,1)ERASE
ALL:"Remember, when you need to
use a Control character in your
logon file, type it"
1120 DISPLAY AT(4,1):"in this form:
' ' and the letter that goes with the
character-- "
1140 DISPLAY AT(9,1):" so ' C' =
Control-C."
1160 DISPLAY AT(11,1):"Also, type
in a Carriage return as -- 'CR' or
' M' "
1180 DISPLAY AT(16,1): "You can
get a maximum of four seconds with
each time delay between com-
mands."
1200 DISPLAY AT(19,1):"but these
delays can be run in sequence to
make a longer delay, if needed."
1220 DISPLAY AT(24,4)BEEP:
"Press any key to begin"
1240 ELSE CALL CLEAR " GOTO
220
```

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There's only one thing missing in that listing: the original screen formatting. The prompts and help screen were originally written for Extended BASIC's 28-by-24 character screen. However, in editing the listing in TI-WRITER for 75-character lines (needed to run with the CHANGE program) and after you read this with TEII's 40-by-24 screen, the formatting will be lost. I'll have to depend on you to make the corrections when you prepare this program to run on your machine. •

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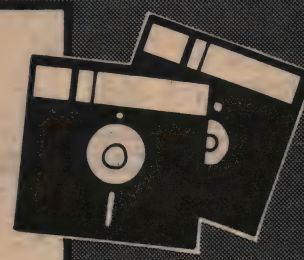
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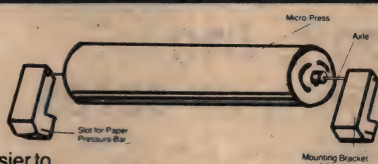
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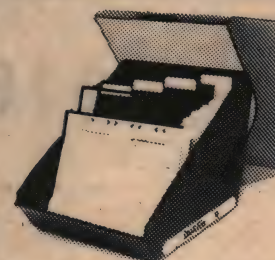
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16-20	5.25	7.25	8.50	10.00
21-25	6.00	8.50	10.00	11.75
26-30	6.75	9.75	11.50	13.75
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Texas Instruments Launches "Dare To Compare" Campaign

A major merchandising program that highlights the superior features of the TI Professional Computer has been announced by Texas Instruments.

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struments. The "Dare to Compare" campaign is supported by national television and print advertising. The ads invite buyers to visit participating TI Authorized Dealers where a special demonstration area is set up to help customers compare the features of the TI Professional Computer against the popular industry-standard IBM PC.

"We have designed this campaign in response to dealers, customers and our own market surveys that have suggested that we provide a better opportunity for people to see and compare our computer,

feature for feature," said Tom Ellis, vice president of marketing for TI's Data Systems Group. "The 'Dare to Compare' campaign is key in our over-all objective to secure TI's place in the upper-end of the microcomputer market."

"TI is not just issuing unsubstantiated claims with 'Dare to Compare,'" Ellis continued. "We're challenging people to prove TI's superiority for themselves by making a side-by-side comparison. We've chosen the IBM PC-XT as a comparison because it is representative of the high standards that the TI Professional

Computer is up against."

"We believe the TI Professional Computer is a superior machine -- and it has been recognized as far superior by many industry trade publications that have had the opportunity to review it in depth," said Ellis. "TI is now taking that message of superiority to the public and asking potential buyers to decide for themselves before making a purchase."

Customers can visit any participating TI Authorized Dealer location, including many ComputerLand stores, to run a comparison. A special "Dare to Compare" demonstration area will be set up in each store. Customers simply insert a diskette into the TI Professional Computer to begin self-running demonstration. They then insert the same diskette and perform the same demonstration on the IBM PC and compare the results.

The "Dare to Compare" demo allows comparison of the following applications on the two machines: color graphics and spreadsheet from Lotus(tm), graphics from

BPS(tm) Business Graphics, and Multimate(tm) word processing on both the IBM PC and the TI Professional Computer. "The diskette demonstrates TI's easy-to-use keyboard, which is based on the familiar IBM Selectric® design," said Ellis.

"The TI Professional Computer has isolated cursor controls and a separate numeric keypad. These features greatly increase the speed of data entry as well as reduce keystrokes and the chance for errors. With eight colors compared to IBM's four, the TI Professional Computer can display more information without the confusion of representing two different pieces of data with the same color. And users can see for themselves that the higher resolution of the TI color monitor is easier on the eyes."

For more information write or call Texas Instruments Inc., Data Systems Group, P.O. Box 809063, Dallas, TX 75240 or phone (800)527-3500.

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Finding Your Way Through The Networks

by Rich Fields

Signing on the networks and finding your way around in them is not hard, once you know the way. However, like every other road you travel, you have to know how and where to start and where to go. After you have been there a few times it's easy to get back. Some networks are more difficult than others because they have more different things on them. Dow Jones News/Retrieval is by far the simplest to use, and Delphi comes next. The Source and CompuServe are the complex of the information utilities (Videotex) systems and the data base systems like Dialog, or BRS are the hardest to use. Both Dialog and BRS offer classroom instruction at various levels for researchers who need training in the use of the system. Knowledge Index, the non-prime-time version of Dialog, or BRS After Dark do not require any classroom instruction.

Telephone Access

Most of the networks can be reached by using TYMNET, TELENET, or UNINET and the procedure is about the same for all of the networks. When there is a variation, the network will tell you about it. Although you can get into CompuServe from Tymnet, do not use it for CompuServe access unless there is no direct access number in your area.

You will be charged extra for using Tymnet to access CompuServe. There is no extra charge on The Source to use

Uninet or Telenet. Delphi is accessed from Tymnet, or from their own access numbers.

Dialing Telenet

Telenet access numbers are obtained from The Source and numbers are updated every so often. They may be found in The Source Digest with the procedure to use them.

After you dial the Telenet number you will hear a high pitched tone. This indicates that the connection has been made. Place the telephone in the rubber cups if you are using an acoustic coupler. If you are using a auto-direct connect, the connection will be made. You will see the cursor on the screen. Press the RETURN key twice. The words TERMINAL = will be shown on the screen. Enter your terminal identifier as explained in the Source Digest, and press RETURN.

TERMINAL = D1 (D1 is the ID for CRT terminals (RETURN). Next, the terminal will display "@" sign. This means it is asking for your assigned computer system, number (Refer to Source Digest.) To supply this type in the letter "C" then a space, then the appropriate 5-digit number as listed in Source Digest ie:

C 30128 (This is for System 13) You will then see the typical message: (every system has a different number)

30128 CONNECTED
WELCOME, YOU
ARE CONNECTED
TO SOURCE
SYSTEM 13

PLEASE TYPE ID
THEN YOUR
NUMBER AND
PASSWORD
>-----
ID TCAOOO JOE (RETURN)

You are now signed on to system 13.

Tymnet Sign-On Procedure

This applies to all Tymnet users. Read your network manual for the differences between this procedure and the variation in the manual.

Note:

Using Tymnet on CompuServe will cost extra. If you are a Canadian, using DataPAC, it can cost as much as \$8 per user.

After you dial the number and hear the tone indicating connection, you will see the

words:

PLEASE TYPE
YOUR TERMINAL
IDENTIFIER

Terminal IDs on Tymnet are simple: "A" for a CRT, "E" for a thermal printer, "G" for a belt type printer, and "T" for a matrix printer.

When you have identified your terminal, you are asked to log-in. This is different for the various networks that use Tymnet. For most of them you just enter the name of the network like "DELPHI". Tymnet will give the name of the network and then some code numbers. Then press RETURN.

PLEASE TYPE
ID THEN YOUR
NUMBER AND
PASSWORD

The Tymnet procedure for your network will be explained in the manual you get when you join. For example, on DELPHI:

After you log-on Tymnet, it

asks "PASSWORD" and you just press RETURN. Then you see some words and numbers on the screen telling you that you are on the network. DELPHI prompts:

WHAT CLASS? -- You enter "K" (RETURN) then you enter "GO" (RETURN) PASSWORD?

You enter your password. If it is accepted, you are on the network and you will see a greeting message and then the main menu. Networks are in a state of change, so if this exact procedure varies, don't be disturbed, you will be prompted by the network to do the correct thing. Always remember the magic word HELP.

If your sign-on is not accepted by the system, it is because you have done something wrong; the system will tell you that you are not

Continued on page 120

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105	Columbia ZDR	CALL
106	Epson Computer ZDR	CALL
107	Altos Computers	CALL

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111	Okidata 83A/93PC	CALL
112	Epson RX80	\$299
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114	Qume Sprint 11/40	\$1499

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119	Shugart	CALL

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132	MAYDAY (UPS) 600 Watt	\$990
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Software at Discount Prices

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See Page 86.

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Networks Continued from page 119

signed-on and then tell you why. You will be given several chances to correct the wrong, ID or PASSWORD and then you will be disconnected from Tymnet or Telenet. If you just sit there and do not enter anything, the connection will be broken after a time. This is called "Time-Out".

To sign-on The Source through Uninet, dial the access number.

Uninet response:

UNINET: LP

USER: Press Return (will not line feed)

Type a Period <.>(will not print)

Press Return

Example: <CR.<CR>

UNINET: SERVICE:

USER: S12 then Press Return (S12 is the service address for all accounts on The Source system 12. Check your contract for your host system number and then check the list below to see which one you should use here.)

UNINET: *U001 000 CONNECTED TO 70300009 Connected to The Source

USER: Press Return

You are now connected to The Source. Regardless of your entry method, at this point you will always enter ID, then your account number and password. Ex. >ID XYZ000 SOURCE.

SERVICE ADDRESS LIST

System	10	=	S10
System	11	=	S11
System	12	=	S12
System	13	=	S13
System	14	=	S14
System	15	=	S15
System	16	=	S16
System	17	=	S17

If you have any questions about this service, UNINET Customer Service may be

reached at (800) 821-5340.

CompuServe Sign-On

If you join CompuServe, you will be using their communications network most of the time. Even if you are going to an area where they do not have an access number, look for the nearest one and figure out what the telephone toll charges would be to that number. The Telephone Company will help you with this if you can't find it in the local directory. Then make a decision as to the cost of Tymnet at \$2.00 per hour extra vs the telephone toll.

When you dial the CompuServe number you will hear the modem tone, then the word "CONNECT" will appear on the screen. Then a message telling you what node you are on, and what number you are on that node. Jot down that number because it is used to send messages to others that are also on the net (you can get it later).

02NYC - This is the way it appears on the screen. HOST NAME - This is the name of the service you want. CompuServe has various services such as INFOPLEX, and others. In this case you enter the initials of the network:

HOST NAME CIS -(CIS means CompuServe Information Service.)

USER ID - You enter your ID number.

PASSWORD - You enter your password. It will not show on the screen when you type it in. If the ID and password are accepted the message:

CompuServe Information Service

00:00 EST DAYOFWEEK DATE

Appears on the screen and then the initial menu usually "WHAT'S NEW" if you have selected Videotex as your starting service.

1. Home Services
2. Business & Financial
3. Personal Computing
4. Services For Professionals
5. The Electronic Mall (tm)
6. User Information
7. Index

Enter your selection number, or H for more information.

If you enter "H" you will get HELP. Several screens designed to help you get through the system.

If you enter a number, you will go to the top menu of the area you select. Let us go to the Personal Computing area. At the prompt we enter 5:

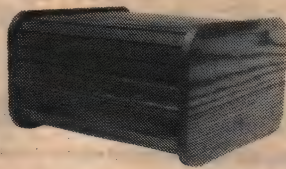
15 We are now at the top menu of Personal Computing.

Personal Computing

1. News

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Continued on page 121

2. Reference
3. Communications
4. Shop at Home
5. Groups and Clubs
6. Personal File Area

Last menu page. Key digit or M for previous Menu.
15

We entered "5" because we want to go to the SIGS.

On CompuServe, you select either the Programming area, or Videotex to start your session. Your choice is made according to the service you use the most. If you select the Programming area, you will see the prompt "OK" appear on the screen first. Then you enter your commands. If you want to go to the Videotex menus you enter "R DISPLA" and you will see the Main Menu.

Again, if you enter something incorrectly, the system will not accept you, and it will give you additional chances to enter the correct password, then it will sign you off.

If you have trouble call the Customer Service number you have received. It is usually an 800 number and is toll free.
An Important Word About Passwords

While you are on any network, you are identified by your ID number, plus the name you choose (Your "handle"); this is a holdover from CB. Many SIGs do not allow the use of "handles". You are allowed to use your first name, but your complete name and ID must be registered in the SIG log file.

Everybody knows your ID and therefore if they know your password they can charge time to your account. Many people have been tricked into giving their passwords to others

on the network and found that they had a big bill for time they did not use.

Do not give your password to anyone, for any reason. Sometimes the thief will represent himself as a person working for the network and give a logical reason for getting your password. Don't fall for that one. Network people only need your ID and THEIR PASSWORDS to help you, they have no "need to know" your password.

Lost Passwords

Sometimes you will forget, or lose your password, therefore you must ask the network for a new one, or to find your old one. They are very careful about this. Don't expect to get it on the phone. It will take over a week, so be careful.

CompuServe uses encoded passwords. They are encrypted into the computer and no one (including them) can get them out! If you need a password, they must cancel you and re-enter you over again!

The computer generates a password and they send it to you by mail. Then you use it to sign on the system, then you change your password to one of your own. Write it down somewhere, without your ID and the name of the network. Then if someone finds it, there will be no meaning to the word.

When you use Telenet, Tymnet, or Uninet your Terminal ID will tell the communications network what kind of a terminal you are using, in a general way. Most networks do not do anything fancy, that requires them to use all the "bells and whistles" on a terminal. CompuServe has a program which allows the user to change the assumptions the system makes about your terminal (called Defaults). There are two ways to reach this program. One is

through the programming area by entering the command "R DEFAULT" or by reaching the same program through the menus. It is found by asking for "USER INFORMATION", or issuing the command GO CIS-9 from the "!" prompt. DEFAULT will enable you to change your terminal parameters from the default values in your computer. It also will enable you to change

your log-on choice of where you start and how you are told about EMAIL.

The DEFAULT program is self-teaching and if you do not want to change something, you just press RETURN.

Although they do not discuss it in the manuals, the other networks have programs that do the same thing as DEFAULT on CompuServe. If you have trouble with the way the

system operates with your terminal or computer (a memory mapped computer is considered a terminal), call the network and ask them about it.

If your computer or terminal is an older one, perhaps one no longer made, they may take a day or so to give you an answer, but if you can tell

Continued on page 122

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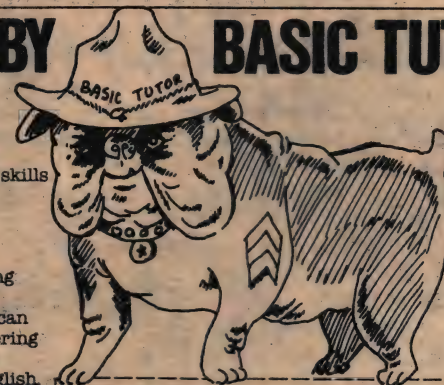
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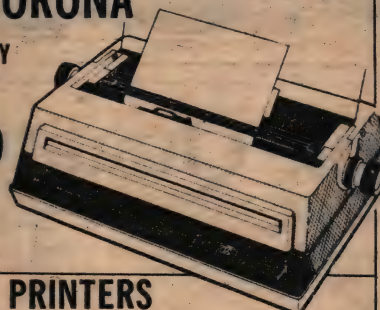
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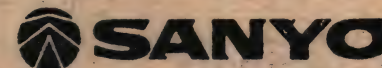
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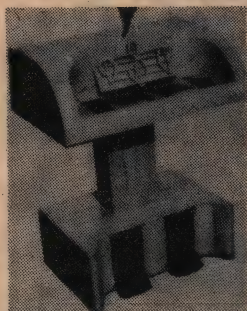
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Networks

Continued from page 121

them the characteristics of the video display (from your manual), they will be able to help you.

Using The Menus

The Menu system on all of the networks are hierarchical, that is they are designed like the structure of a tree, turned upside down. The Main Menu in every case is like the trunk and when you select topics

listed on the main menu, you are routed into a branch. Each branch has its own sub-menu and you keep making selections until you arrive where you want to go. At any point while you are traversing the tree structure, you can return to the

menu at the next higher level by entering some delimiter symbol. On CompuServe it is the letter "M", on Delphi it is the word EXIT, on The Source you type the letter "P" (for Previous). Other networks have similar methods, and each instructs you how to use it on the screen. (Remember, you can always use the magic word HELP).

It may occur to you that traversing the menus is not only a boring way to spend your time on the networks, but it is a waste of money because the meter is always running (except when you are talking to the network management) and the minutes cost from \$0.09 to \$0.13 plus in some cases the cost of the telephone and the Telenet or Tymnet charges.

Finding Your Way Without Menus

To make the whole operation faster and less expensive, each of the networks has some method of reaching your destination without going through the menu tree. In CompuServe you can use the GO command at any prompt "I" you then enter Go (page number) and you are taken directly to that page. In some cases you may not know the direct page number but you do know the page number of the next higher menu. You

therefore can go to the menu and use it to find your way.

On The Source you can always go into the Command Level and give the menu name as listed in Source Digest. You can also string menu names and index numbers together from Command Level or from any menu selection prompt. >menu 37 for example will take you to the Comp-U-Store discount shopping service since 3 is the item number on the Main Menu for Catalog Shopping and 7 is the item number on the Catalog Shopping Menu for Comp-U-Store. (See the Source Menu tree reference).

At first you may find that getting around the networks without menus is confusing, but if you keep a pad and pencil near you can jot down the names and reference numbers of the screens that you visit, in a short time you will seldom use the menus. Once your curiosity about the offerings on the networks are satisfied you will now stop looking at anything besides your areas of interest.

It is too expensive to look at everything, and too time consuming. Once in a while, the opening message alerting you

Continued on page 123

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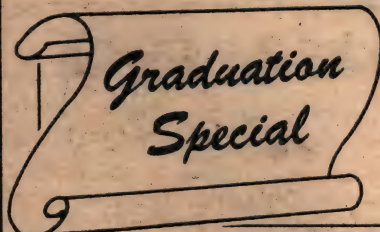
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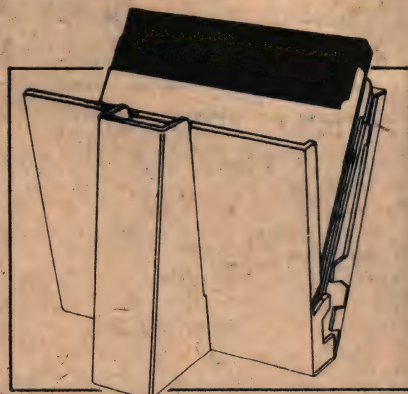
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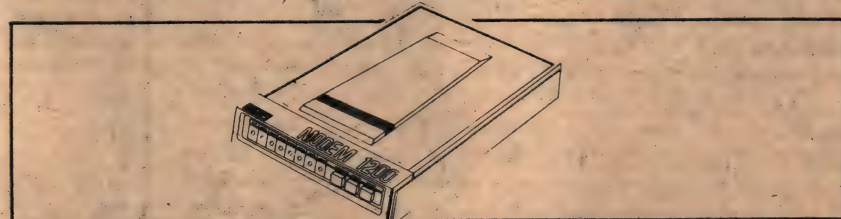
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Networks Continued from page 122

to some special offering will lure you to examine that screen, but for the most part you will stay with the areas that offer you important information. Some people spend all their time on the CB, because

that is their hobby. They never look into the personal computing SIGs; it's too technical for them. Others only use the stock quotation or financial services; they never play Star-Trek. Still others use the data bases for research; they never look at the News.

Sending And Receiving Electronic Mail

This is by far the most important function of the computer networks at this time. The US Postal Service has failed to keep up with modern technology and the requirements for fast accurate mail delivery in business. The telephone lacks the ability to deliver "hard copy" and requires that both the com-

munications persons be present at the same time. A typical problem is the East Coast/West Coast communications problem. People on the East Coast go to work while those on the West Coast are sleeping. When the West Coast people are coming to work, the East Coast people are going out to lunch. When they get back from lunch there is a short "window" when they can call each other, then the West Coasters go to lunch. When they come back, there is another short "window" and then the East Coast people go home for the day. It is a small wonder that

business ever gets done in this intercontinental nation. International trade has the same problem from the US to Europe and Asia.

The simple solution to this is electronic mail and both business and private people are starting to use it in increasing numbers. Everyone is getting into the act.

It is very simple to use. When you sign-on to the network, you use their word processing program (Editor) to

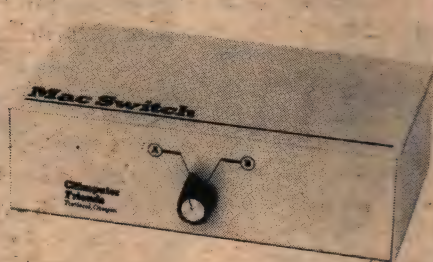
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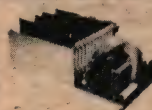
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Networks

Continued from page 124

a message, you can forward it to another subscriber, or you can delete or store it in your file area. When you sign-on the system you can do a Mailchk (mail check) using a Scan command, or you can read each message in sequence. You can

then forward the message, reply to it, delete it, or store it in a file. You can also send a "blind" copy to a subscriber where the other recipients on the distribution list will not see that number.

One other powerful option of Sourcemail is the ability to create text files, financial models, or portfolio information on the network and add

them to the contents of a message to send to another. You can also send Mailgrams through the Source, Western Union and the U.S. Postal Service.

The Source is now part of the U.S. Postal Service ECOMM service for the distribution of electronic mail. Using these services you can now send electronic to some-

one who is not on any network.

CB Simulation On CompuServe

One of the most popular non-computing activities on the network is the CB simulation. There are 36 channels which can be used for interactive conversation on the network. You can also monitor up to two additional channels while you are talking on the channel of your choice.

While communications on the 11-meter CB channels are limited to a few miles by the power requirements of the FCC, the CB simulators on CompuServe permit conversations with people all over the United States and Canada. In addition, there are channels that are reserved for adult conversations that might be objectional to some other people. CB fans use "handles" in place of their names and some of them become very well known through their presence on the network. Friendships evolve from conversations on the network and there is a mode in which two or more people can engage in a private conversation.

In keeping with the simulation of radio CB, Channel 19 is the general calling channel. Channel 1 is the one for adult conversations while Channel 30 seems to attract Gay People. On the channels between, people meet and talk on channels where there are not so many people.

There are commands which give you the status of each of the channels and the ID, job number and handles of the people who are currently tuned in.

Instructions for the operations of the CB simulations are available on the network and there are always people who are glad to help a new user.

At this point, a warning is in order—while most of the people you will "meet" on CB are friendly and helpful, there are also those who would take advantage of an unwary new operator. These people try to obtain someone's password and then use it to sign on to the network, running up charges to the person whose password and ID are being used. This can go on for a month or more before the victim realizes that they are being billed for time never spent on the network. Never give your password to anyone, even if they claim to represent the CompuServe Company (a favorite trick). Change your password every few months (more often if you are on the net a lot).

While you are learning to use the CB channels, you can sign on and "listen" to what is going on. It is considered good manners to announce yourself by saying Hello. People who listen and do not make their presence known are called "lurkers" and are not well thought of on the network.

If you decide that you are interested in the activities on CB, you might want to become better acquainted with the people

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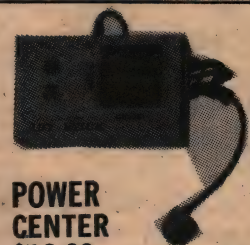
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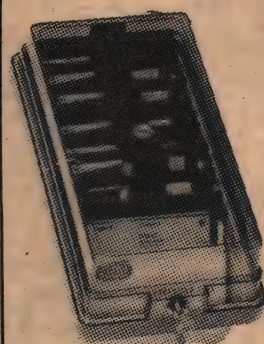
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Networks

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who are active on the CB channels. In this case the CBSIG is an activity you will be interested in joining. They have various activities of an educational and social nature to enhance your enjoyment of CN on CompuServe.

The CompuServe National Bulletin Board

The CompuServe National Bulletin Board (BULLET) is one of the oldest services on the network. It is the original

bulletin established when the network was known as Micronet. The purpose then, as it is at this time, was to provide a free channel for the sale and purchase of items owned by the members. To find out what is being offered, the subscriber enters the bulletin board and after seeing the prompt (*) requests a SCAN of the items for SALE on the board:

*Scan Sale (CR)

The system responds with the complete list of items in a format listing the Item number, the ID Number of the member posting the item, the

date of posting and a keyboard describing the item. It is best to print out this list to select the items of interest since it is quite long. If some of the items offered are interesting to you, then you enter the READ command and the number of the item.

*Read (Item Number)

The system will then print out the requested item. If the subscriber wants to enter an item, he requests the COMPOSE command. This puts him into one of the system editors (FILGE). The notice is composed and then Posted in

the board under a keyword. A typical list of ads and notices shows that the bulletins on CompuServe are a good method of buying and selling non-commercial items.

Most of the computer SIGs will not allow commercial sales on the network, but CompuServe itself does sell software on a commercial basis as a service to the members. The commercial groups like the Fifth Ave. Shopper have been established with a sales purpose in mind. They do offer a service to members that is not obtainable unless you live in New

York City.

Participate On The Source

There are no SIGs on The Source and no Forums or Clubs moderated by SYSOPS. However, there is computerized conferencing conducted through the use of a system called PARTICIPATE which was developed by Participation Systems of Boston and is only available on The Source. In this system anyone, or a group of people set up a conference on a particular subject.

This is listed on The Source and other members who are interested in the subject can join the conference, read what has been said and can contribute to subject by leaving messages. Sometimes, a discussion ensues that leads to a branch off the original topic. Votes can be taken if the subject calls for it and results posted on the conference. People on PARTICIPATE are known by "handles" although there is an optional index of the name of the members and ID numbers of the members.

Most conferences permit anyone to join and to participate, but some are closed to all but invited members. All others may read the proceedings but may not join in and add comments.

There is no fixed end to conferences on Participate, they go on until the members decide that they are to come to an end. The person who starts the conference is responsible for the storage charges, but this is offset by the "earnings" of the conference in terms of time charges from subscribers who join in or read the proceedings.

Learning to use the PARTICIPATE system requires learning the commands and getting used to the system. All of the instructions are on The Source and can be downloaded and printed by a subscriber.

There is a Practice conference to join to get used to the system. Any newcomer should first join this conference to gain experience.

While PARTICIPATE is an interesting experience, it lacks the human element that exists in the SIGs (Forums) on CompuServe. The user can accomplish the same objective in the SIGs by following the "Threads" of any set of comments. In addition, the SIG has the service of resident experts, to help newcomers and to answer questions. It does not depend on the chance that someone who knows the answer will come along, read the question and answer it. This is the weakness of

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Continued on page 127

Networks

Continued from page 126

PARTICIPATE.

Self Publishing
On The Source

The Source gives everyone who has the desire to publish an electronic magazine a chance to do so. A perspective publisher can submit the idea for a new publication to the network and as long as it is within reason and the publisher can show the ability to carry out the proposal, The Source will permit the new publication to come on-line. The publisher is responsible for the storage charges for the material, but receives a percentage of the billable time logged on their programs. This is payable quarterly and the percentage is based upon the amount of the charges. Royalties run from 17.5% to 15% with the percentage decreasing as the total billable amount goes up. The publications vary in purpose from a sex oriented commentary, to a general humorous newspaper about an imaginary rural village, to a complete listing of all the Electronic Bulletin Boards in the United States, Canada, and England. The User Publications are one of the better things on The Source and offer the subscriber something unique for his money.

CHAT On The Source

While there is no conference area where many people can be on-line at the same time engaging in "conversation", there is a facility called CHAT. To use this, a member reads the on-line index of current users and asks either for a particular person, or "anybody" to engage in a chat. If the other party agrees, they can hold a conversation for as long as they want to. Subscribers can also meet for CHAT by appointment. Only two users can be in the conversation at one time.

VI Joining The
SIGs, Clubs

1. Special Interest Groups

CompuServe is the network for Clubs, Special Interest

Groups (SIGs) and FORUM (a Forum in most cases is the same as a SIG, except that it is non-technical). They do not exist on The Source except as Conference Bulletin Boards and User Publications—which are not the same thing.

Delphi is starting SIGs but it is too soon to see if they will get organized in the same way.

A Special Interest Group,

(SIG) or Forum starts when a group of subscribers have a common interest and organize to spend time on the network to discuss it or offer help to each other. In some cases they are a purely social organization such as The Netwits or Clubig which grew out of the CB on CompuServe. In other cases the organization and focus are provided by a magazine such

as Computers & Electronics (CEMSIG). Other SIGs are sponsored by a computer manufacturer as a place to help owners of their computer (Commodore), or users of a software operating system (UCSD PASCAL, or LDOS). Several of the larger SIGs started as Sections of other SIGs. For example, The Atari SIG started as a Section of

CEMSIG. When membership grew so that it started to dominate CEMSIG, it was split off and became a SIG in its own right. It is sponsored by CompuServe and the members, not Atari!

2. Scanning The SIGs.

Each SIG has three major

Continued on page 128

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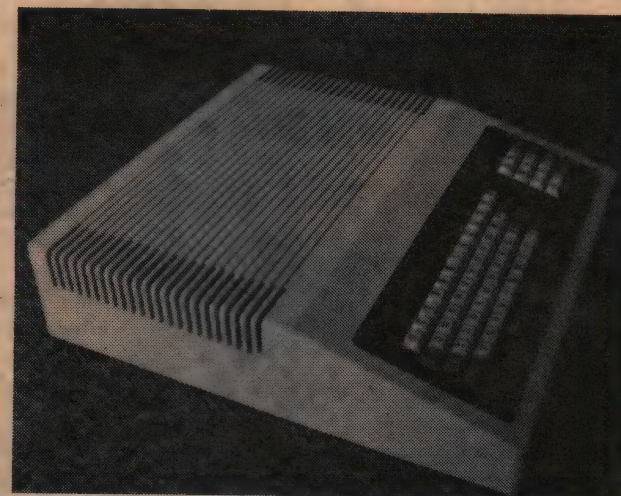
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Networks

Continued from page 127

areas associated with it. They are:

- Message area
- Conferencing
- Data Base Section

The message area is the most often used area. It is used for the exchange of information between the members or from the *SYSOPS to the members.

The Conferencing area is a live interaction between members who are all on the net at the same time. It is similar to CompuServe's CB except it has restricted access. It enables the members to discuss a subject "live" no matter where in the country they are located.

Often, guests are invited for interviews on the CO area and the live interplay is interesting and informative.

The Data Base area is one of the major attractions for computer owners. Here SIG members may store public domain software, articles, recipes or whatever collected information is interesting to members.

There are two parts of the database; one is the member interest database where members list their interests so that others looking for people with the same interests may find them.

The SIG Access Data base is where articles and programs are kept for member use. It is divided into sections by the Sysop according to members interests, so that the user can find only the material concerned with a special interest.

3. Joining The SIG.

There are various requirements of joining SIGs and Clubs. Most of them merely request that you indicate a desire to join and agree to abide by the simple rules. Others require a fee, or membership in some organization in order to join.

Some of them will give you membership privileges as soon as you sign-on, others require a week or so before you become an active member. The benefit that a member gets can be quite valuable. Most

computer SIGs maintain a library of public domain software for one or more computers. If you are a member, you can look at the catalog and upload any of the software to your disk drive for your own use.

Many members also contribute software to others. In the CP/M SIG, the contributed software that is most popular gains its author free time on the SIG for one month.

4. How To Enter A Club, SIG, Or Forum.

To find the Club, SIG, or Forum you are looking for, you can go to either of two menus. One page HOM-50 is for the non-technical clubs. The other PCS-50 and its continuation PCS-100 is the technical Forums and SIGs.

CompuServe Page PCS-50
 1 CP/M SIG 11 PowerSoft's
 2 HUG (Heath) 12 Programmer's
 3 MAUG (Apple) 13 CEM SIG
 4 MNET-11 (H11) 14 Author Forum
 5 MUSUS p-sys 15 Commodore
 6 EpsOnLine 16 Atari SIG
 7 TRS80 COCO 17 IBM PC SIG
 8 Panasonic 18 OSI SIG
 9 MNET80 TRS 80 19 Instructions
 10 LSI Users 20 Descriptions
 Input a number of key
 <ENTER> for more choices
 !

There are now so many SIGs that a second menu has become needed to list them all. If you have found your SIG, you enter its number. If you want to see the rest of them just hit RETURN (ENTER). Here they are:

CompuServe Page PCS-100
 PERSONAL COMPUTING SIGs
 1 MicroSoft Users Group
 2 Telecommunications SIG
 3 TRS-80 Model 100 SIG
 4 Computer ART SIG
 5 VAX SIG
 6 OS9 Forum
 7 RAC Micros
 8 TRS-80 Professional Forum
 9 Whole Earth Software
 10 Texas Instruments Forum

11 Kaypro Forum

Last menu page. Key digit or M for previous menu.

From either of these menus all you have to do is to select the number of the Club, SIG, or Forum you want to go to:

When you have been to a Club, SIG, or Forum once, you can return there by using the GO command at any prompt "I". For example, !GO PCS-116 will take you directly to the Commodore SIG, !GO PCS-27 will take you to the T.I. Forum.

Once you are on the SIG and have "Joined" you will see a short bulletin with the latest information about the SIG. After that, you will see the first SIG menu prompt:

Function:

The Function Menu.

The Function Menu is the principal SIG menu. If you type Help you will receive a list of the commands you can select. The functions are shown in the figures just as they are listed on your screen.

Not all of the Functions are used in every SIG, therefore the first time you sign on a SIG, enter Help after the Function prompt to see the ones that are used.

The Options Menus.

In addition to the Function Menu, there are a number of options you have at the conclusion of each function. Some of these have a group of selections comprising an Options Menu. They are also shown in the figures in this chapter. You can get this list any time by entering Help.

One way to get all of the SIG information is to select Instructions at the Functions Help Menu. The system will show you all of the SIG commands. It is not wise to do this unless you have a printer connected and working. There are many instructions and they go very fast on the screen.

Subject Threads.

One of the most informative ways to follow what is going on in the SIG is by following the "threads". Every time a new topic is started, that is a thread and all the following answers will be identified by the thread name. If a message is deleted, the thread can be tied so that it can be followed by a reader. Sometimes threads go on for months with many contributors.

5. Sending And Receiving Messages.

To send a message to a member, you enter "L" at the Function prompt. The system then asks who you want to leave a message for and the subject of the message. It then gives you a clear area to type in the message, one line at a time. A line may not be longer than 83 characters. The text will wrap around if your screen is less, until you hit RETURN. The system then shows the next line number and you continue typing your message. When you are finished, instead of typing a line, you enter a Control Z. The system will then ask you for a Leave Option. You can select any of the leave options shown in the figure in this chapter. You can edit the text, delete lines, add lines or change words until you have corrected it and are satisfied with the contents. Then you enter "S" in answer to the Leave Option prompt and you will see a notice that the message has been stored and what number it is. If the SIG is divided into sections, you will be asked what section you want the message saved in before the message is saved. If you do not know what the sections are, you can find out by using the SN command. You then will be returned to the Function prompt.

Continued Next Month •

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TIMEX-SINCLAIR COLUMN

Timex/Sinclair Users Column

by Mark L. Fendrick

A new computer owner sitting down at the keyboard, and trying to write a program for the first time may find little confusion in simple concepts such as PRINT statements, and simple math functions, but soon will find that these alone will not go very far. A single concept which is not hard to master, however, will make more useful programs possible. This simple but misunderstood programming tool is the array. In fact, all truly useful programs use some form of array. In this month's column we will explore the use of a number of different types of arrays, and their practical uses.

In this, and all future columns concerning programming the Timex and Sinclair line of computers, most of what is discussed will work on both the 1000 series (T/S 1000, T/S

1500, and Sinclair ZX-81), and the T/S 2068 (or Sinclair ZX Spectrum). In the instances where there are differences in the two computers they will be indicated in the text as well as the program listing. Where it is possible, I will be giving methods of duplicating the T/S 2068 statements on the 1000 series.

To understand what an array is and how to use one, it helps to think of it as a chart which will be filled in with various types of information. In a program, arrays are most often filled in the following manner:

```
10 DIM A(10)
1000 FOR F=1 TO 10
1020 INPUT A(F)
1040 PRINT TAB 8;"A";F;"=";"A(F)
1060 NEXT F
```

Let's analyze this program line by line. Line 10 is the DIM(ension) statement necessary to let your Timex computer know that it must set

aside some space in memory for a chart. In this case we are telling it that our chart will have 10 spaces to be filled in. In Sinclair BASIC this statement must appear before attempting to use any array, no matter how small the array is to be. You should, as a rule, put this statement at the beginning of your program, because if it is put into a spot where it will be repeated during the running of your program, each time the computer sees this statement it will erase all the data that you have already entered into your "A" array. Although this might be useful in some applications, for our purposes here, we will put it only at the beginning. Line 1000 sets up a FOR/NEXT loop which will repeat itself ten times. Each time through we fill another space on our chart. Line 1020 is the line which allows the data to be filled in on our chart. You will

notice that we used the control variable "F" (the variable that is used to control the FOR/NEXT loop) within the parentheses to indicate which element of the array we are entering. The number within the parentheses is called the subscript. An element is another way of saying one piece of data within the array. Line 1040 will PRINT on your screen the information as you enter it. When you are finished, you will see your chart, numbered 1-10, with the data you have just entered. The final line in this short example is line 1060, which sends the computer back to line 1000 ten times, and increases the value of "F" by one each time. When the value of "F" is 10, the program continues past this point.

The following example shows another method of filling an array on the T/S 2068, utilizing the READ and DATA statements. Replace line 1020

in the above example with: 1020 READ A(F), and add this line: 9900 DATA 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. In this case, instead of asking the user to INPUT the data, the program (line 1020) READs the DATA statement, inserting the 10 values in that statement into the 10 places in the array.

Although the Timex 1000 series does not have the READ

Continued on page 130




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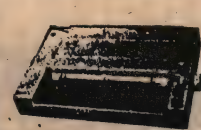
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Timex/Sinclair Users Continued from page 129

or DATA statements, the same thing can be accomplished by taking advantage of the Sinclair Basic's string slicing capabilities. By replacing the DATA statement with line 20 in the following example, you can simulate the DATA

```
statement.
10 DIM A(10)
20 LET Z$ = "10 20 30 40 50
  60 70 80 90 100"
20 LET X = 1
1000 FOR F = 1 TO 10
1020 LET A(F) = VAL Z$(X TO X+2)
1030 LET X = X + 3
1040 PRINT TAB 8;"A(";F;")=";A(F)
1060 NEXT F
```

When doing this, it is important that you decide how many characters that your largest

piece of data will contain, since each new piece of data must start at a fixed interval. In the example above, the largest number we want to enter requires three characters - 100. Therefore, each new entry must start at an interval of at least three characters. Line 30 sets the variable "X" to one, as this is the pointer which we will use to determine the start of each new bit of information.

Line 1020 is the place where the values are assigned to their positions within the array. We use the VAL(ue) statement to do this, along with the string slicing. Since the data is in substrings of three characters each, we assign A(F) the value of Z\$(x TO x + 2). In the first pass through the loop, x = 1, therefore a (1) would equal the value of the first three characters of Z\$. In the second

pass through the loop, the value of x is increased by 3 making it have a value of 4. This time A(2) is assigned the value of Z\$ starting with position 4 through position 6, which in the above example is 20. Note that only spaces may be used to fill in the necessary characters.

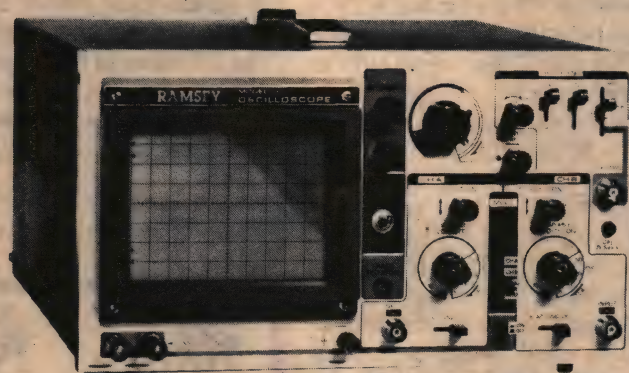
So far, what we have been discussing is what is known as a one dimensional array. This is just a chart with a single line. If we want to create a chart more than one line, we use a multi-dimensional array. Enter the following program to see how this would look.

```
10 DIM A(12,10)
20 PRINT"--
  1--2--3--4--5--6--7--8--9--
  10"
30 FOR F = 1 TO 12
40 PRINT AT F + 2,0;F
50 NEXT F
1000 FOR F = 1 TO 12
1020 FOR G = 1 TO 10
1040 INPUT A (F,G)
1050 IF A(F,G)>99 THEN GO TO 1040
1060 PRINT AT F + 2,G*3;A(F,G);
1070 NEXT G
1080 NEXT F
```

Let's now look at this program line by line. Line 10 again is the DIM(ension) statement, but as you see, it contains two numbers this time. In the first example, we created a chart that consisted of a single line across, containing ten entries. This time we will create a chart that has the same ten entries across, but also consists of 12 lines down. Although it does not matter which number is put first into the DIM statement, you have to be aware of which you have put in which position so that it may be used in the manner in which you intended. In this case the 12 of the array may be used to differentiate the entries by the twelve months of the year. You would then use the 10 portion of the array to keep track of ten entries for each month. Line 20 sets PRINTS column numbers at the top of the screen to show you how your entries are being entered in the array. Lines 30, 40, and 50 do the same for the rows from top to bottom. In this case if you were using it to make entries by month, these would represent the twelve months. Note that these numbers were selected to fit on your screen (32 characters across), but you are not restricted to what can fit in the screen, as the entries are kept in memory, and do not have to be PRINTed. Line 1000 sets up the first FOR/NEXT loop, which will repeat 12 times. Line 1020 sets up second

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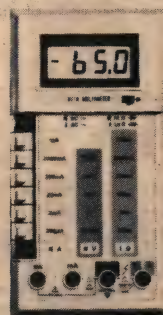


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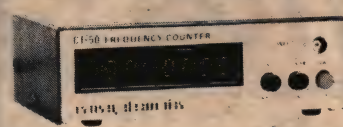
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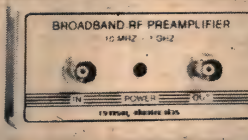
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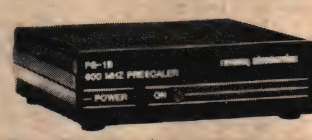
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Continued on page 131

Timex/Sinclair Users Continued from page 130

FOR/NEXT loop, which repeats 10 times. Since when we originally set up the array in line 10 with the 12 first, and the 10 second, the variable that we will be INPUTing becomes A(F,G). We therefore will be filling the array across, and then proceeding down to the next row. For our purposes we will keep our entries to a one or two digit number so that our chart will be clear, so line 1050 sees to it that no number greater than 99 is entered. If such a number does get entered, the program will revert back to line 1040, and request another value, which should be less than 100. Line 1060 PRINTs the entry into the proper place on our chart. Do not forget to put the semicolon at the end of this line. Lines 1070 and 1080 conclude their respective FOR/NEXT loops. Be aware that the GO TO statement in line 1050 will appear in two different manners depending on whether you are using a 1000 series computer, or a 2068. The 1000 series shows this command as GOTO (one word) where the T/S 2068 (and Spectrum and ZX-80) will display it as GO TO (two

words). When referring to a member of this array, you will first read the row at the left, since this is the part of our array which has 12 elements, and the first number in our DIM statement is 12. The columns across the top will account for the second number, since our DIM statement has 10 as the second number, and there are 10 columns across. Therefore the number three from the left, and six from the top will be A(6,4).

Up to this point we have only been discussing numeric arrays, but there are also string, or character, arrays. In this type of array, you can enter anything that the computer can put on the screen. The difference in the DIM statement is that you must state the length of each of the elements of this type of array. Try this program and enter the following data when you are requested to make an entry: ANIMALS; SEASONS; and COLORS.

```
10 DIM A$(3,7)
1000 FOR F=1 TO 3
1020 INPUT A$(F)
1040 PRINT A$(F); " ";
1060 NEXT F
```

Let's look at the DIM statement. First we see that instead of just "A" we have used "A\$" which tells the computer that this is going to be an array

which will contain any combination of characters, not necessarily a number. The first number within the parentheses tells the computer that it must set aside room for three elements within this array. The second number says that each element is to be seven characters long. If you make an entry that is less than seven characters, the computer will add enough spaces to bring the total to seven. If your entry is greater than seven characters, the computer will only recognize the first seven characters, and chop off the rest. The rest of this example is exactly the same as in the examples we used for numeric arrays. We can also work with multi-dimensional string arrays in the same manner as we do with numeric arrays. Again, of course, we must declare the length of the entries. Add this to the program above:

```
20 DIM B$ (3,5,7)
2000 FOR F=1 TO 3
2020 FOR G=1 TO 5
2040 INPUT B$ (F,G)
2060 PRINT AT G+1,(F-1)*8;B$(F,G)
2080 NEXT G
2090 NEXT F
```

The first two numbers in the DIM statement in line 20 declare the dimensions of the array, while, as in the single dimension array above, the

final number states how many characters each element is to contain. This time RUN the entire program and for the first three requests for INPUT, enter three categories of your choice. These will appear on the screen, and will ask for further data. The next five entries should refer to the first category, the next five, the second, and the final five, the last. Were any of your entries longer than five characters? If so, what happened?

With this tool in your programming satchel, you should be able to write some very useful applications. Let me hear from you as to what you've done using these techniques.

The next column will contain a few reviews as well as a list of some interesting sources of software and hardware for the T/S 2068. In the meantime, I will continue to watch my mailbox for your INPUT.

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The Far East Computer Ripoffs

by L.J. Kутten

Nearly everybody is willing to go an extra mile to save some money, but how many are willing to violate the law or help someone else violate the law to do it. If you are like most people, that is where you draw the line.

Yet this is done everyday in the purchase of microcomputer hardware and software. Many computer magazines run advertisements by individuals and companies that import computer components (both hardware and software) from Taiwan, Singapore, Hong Kong, and other Far Eastern

countries.

Example 1: According to an investigation by the United States International Trade Commission, **In the Matter of Certain Personal Computers and Components Thereof**, Investigation No. 337-TA-140, Taiwanese manufacturers have attempted to export to the United States (1) complete Apple-type computers with stuffed motherboards including ROMs, (2) Apple-type computers with stuffed motherboards without ROMs, (3) stuffed motherboards without the computer shell, (4) stuffed motherboards with inoperative ROMs, and (5) com-

puter kits to be assembled by the purchaser.

According to Apple, all "Apple Compatible" computers they have investigated from the Far East utilize unauthorized copies of the Apple II operating system.

This sorry state of affairs arose because of the lack of adequate copyright and trademark laws abroad. Foreign manufacturers have and are riding upon the coattails of Apple and other companies who spent large sums of money to develop hardware and software computers.

The American companies are striking back. They have filed suit in a number of Far Eastern countries to prohibit the copying of their goods. They are slowly winning the battle. Last February, a Taiwanese court sentenced computer copyright infringers to jail.

Compounding the problems are the importers who lie to their customers. They tell the public they are fulfilling a higher public duty by making expensive computer equipment available at prices everybody can afford.

Example 2: One company offered to sell LOTUS 1-2-3 or WordStar for less than \$17 per

copy. Another ad offered an Apple II 64K RAM dual CPU 6502/Z-80 computer from Taiwan for \$250.

They do not import these goods for a higher public good, but rather to make money for themselves by ripping off the heavy financial investment of the American companies who originally developed these products.

These advertisers twist the truth when they claim their goods do not violate copyright or trademark laws. In reality, these cheap knockoffs may not be an infringement in Hong Kong, Singapore, and elsewhere in the Far East (they are an infringement in Taiwan), they are an infringement of American copyrights and trademarks the instant they are brought into the United States.

The cost for importing these goods can be severe for both the commercial importer and the casual importer. Under Section 337 of the Tariff Act of 1930, any merchandise that violates a valid American copyright, patent, or trademark can be prevented from being brought into the United States. This means U.S. Customs can and will seize the goods when they enter the

country.

An importer also runs the danger of violating the penalty sections of the U.S. Copyright Act. Under its provisions, anyone who contributorily infringes upon an American copyright faces civil liability up to \$50,000 along with the possibility of criminal liability.

The commercial importers know this, and figure the cost of seizure and possible fines or imprisonment into the cost of doing business.

But then there are those "sales agents" who try to get around the criminal dangers and civil penalty provisions by passing the risk of seizure on to the customer. They claim they are mere order takers who collect the money in advance and have the goods shipped directly to the customer. If Customs inspects the package and seizes the merchandise, it is the customer's loss and not theirs.

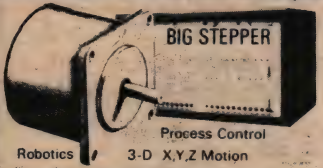
Example 3: According to Dan Wendin of Apple's legal department, thousands of Apple compatible computers have been seized. He has gotten telephone calls from nuns, grandparents, and college professors, who ruefully learned that they had kissed their money goodbye by trying to save a few dollars.

Besides not warning about the risk of seizures, these "sales agents" do not tell their "customers" that Customs keeps a computerized database of everything it seizes, including who shipped it and to whom it was addressed. (Do you want your name and address stored in a Government file saying you were mailed prohibited materials?)

Of course, Customs cannot stop every copy that is being flooded into the country, but the tide is slowly turning. The computer manufacturers have provided Customs with special computers, programs, etc., to determine if these "compatible" computers and copied software violate any American copyright, patent, or trademark.

Ultimately the flood of illegal imports will be lessened. A lot of importers will sign consent judgments agreeing not to import the copies, some will pay large fines, and a few will even go to jail. But the problem will never go away completely. So long as people think they save money by buying illegal copies, there will always be someone willing to sell them.

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COMMODORE

Electric Magazine BBS

Version 3.1 of "Electric Magazine" which will turn a Commodore 64, with 1541 disk drive, and the Commodore 1650 automodem into an electronic bulletin board system has been announced by D & B Software.

Features of 3.1 include:

Ability for remote sysop and file writers to remotely update menu files. Callers may stop and restart screen scrolls or escape from reading a file. Time connected is displayed to callers. Callers name, log on time, and log off time as well as private msgs can be left to optional printer. Board is self regulating in that it will automatically add new msgs and delete the oldest msgs. Callers are told what msg numbers the board contains and may start reading at any msg number.

Tones to alert sysop when call comes in or when caller is paging. Plus other features not found in some other versions of "Electric

Magazine".

Program comes on disk with two other pgms. A test program for the sysop and also a pgm to write files if the sysop does not have a word processor. The files pgm has also been updated to add some new features. Disk comes with test files so that the new sysop can boot it up and be running right away. The program is written in BASIC and can easily be changed to tailor the board to the new sysops needs. Comes with easy to understand instructions.

Price is \$42.50 and can be obtained from D & B Software, P.O. Box 2154, Columbus, MS 39704.

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Memory Expansion For Commodore 64

The unexpandable memory configuration of the Commodore 64 is no longer unexpandable! LETCO, the pioneer of the popular 64K memory expander for the VIC 20, announced the adapter (Model 64KVA) to use with their 64KV memory expander on the Commodore 64. When used on the C-64, the addresses from \$8000 to \$9FFF will have 8 separate blocks of 8K locations, each block selected by a single poke instruction. Current owners of the 64KV only need the adapter to use their memory on the C-64.

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(Model 64KC) for use on the C-64, is priced at \$139.95. Complete instructions are included with each product. All products are covered by a 90 day warranty on parts and labor and of course satisfaction is guaranteed within 90 day return period.

LETCO will soon announce the ultimate expander for the 64, that will allow up to 256K bytes of expansion. Of course, current products will be compatible and pricing is expected to be about \$140 per 64K byte module.

LETCO is currently working with many popular software suppliers to incorporate these added capabilities to their current and future releases. Just think of the

power that can be added to your word processor or spreadsheet programs.

All products are available directly from Leader Electronic Technology Company LETCO, 7310 Wells Rd., Plain City, OH 43064.

Mention that you read it in Computer Shopper. ●

Inside The VIC 20/Commodore 64 by Ted Drude, Part VII; scheduled for this issue was not received at time of publication and is therefore not in this issue. We expect to resume this series in the next issue.

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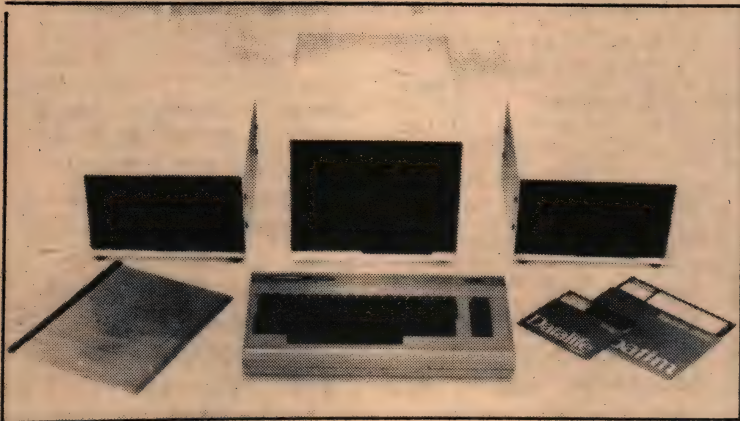
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For more information write or call, Estes Electronics, Inc., Box 753, Salina, Kansas 67402, Telephone 913-827-0629.

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See page 75 for detailed ad

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Orange Micro, Inc. is proud to announce the Grappler CD intelligent printer interface for the Commodore 64. With four different operating modes, the Grappler CD is the most complete interface available. Aside from standard code conversion, Grappler CD contains a Commodore 1525 Emulation Mode which causes the printer to create characters as they would appear on the C-1525. This means graphics and special characters can now be printed by Epson, Star, Okidata, Prowriter, NEC, and other dot matrix printers. It also provides universal soft-

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The innovative screen dump routines allow the printing of hi-res and block graphics with a variety of options. Double size, inverted, rotated, and emphasized graphics are accessible via simple commands. Special screen dumps for Epson FX/RX aspect ratios are also included. In addition, the Grappler CD includes a host of text formatting features, with margin and page length setting, screen dump and more.

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For the Commodore 64, Grappler CD is the new standard for compatibility. It's available through a worldwide network of Commodore dealers and computer stores. For a dealer near you, contact Orange Micro, Inc., 1400 N. Lakeview, Anaheim, CA 92807 or call (714)779-2772.

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D'Switch allows the connection of three (3) additional peripherals to a Commodore 64 or VIC 20 computer when devices without a serial output plug are added to the system. Using the switched connectors, two peripherals with the same

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Depth:	6 13/16 inches

Nominal weight: 20 oz.

For more information contact LAWCO, Ltd., P.O. Box 1337, Cupertino, CA 95015 or call (408)733-0739.

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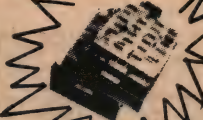
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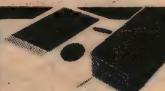
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Commodore 64 Gets Arcade 25



Space Taxi, a new arcade game with what the manufacturer calls "twenty-five multi-action screen predicaments," is the latest release from Muse Software.

Designed solely for the Commodore 64, Space Taxi places its players in joystick control of a flying cab plying the intricacies of a whimsical twenty-third century city.

The goal in Space Taxi is to earn as much money in fares and tips as possible while contending with moving obstacles and other hazards that differ in each of twenty-four screens. If they make enough money,

players earn an additional bonus "mystery" screen combining arcade action with fantasy and adventure features.

No one, not even the game's author, has completed the entire series of twenty-five screens.

Space Taxi requires Commodore's 1541 disk drive. Manufacturer's suggested retail price is \$29.95. The product is available from software dealers nationwide and from Muse Software, 347 N. Charles Street, Baltimore, MD 21201.

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Osdex Book Review

by Cheryl Peterson

Here is a useful book if I've ever seen one. For those who haven't stumbled through the Osborne User's Manual, it is a zoo. What was intended to be a tutorial and instructive manual turned out to be a maze of disconnected topics. Part of the problem was caused by the great software package that came with the 01. Instead of devoting a section to each program's use and keeping everything the user needed under one roof, the manual's authors put the easy tutorials for the programs in one section and the advanced tutorials in another. Then to further confuse matters, they added a general reference section and several appendices. What they didn't add is an index.

What this means to the average user is that checking the syntax of an MBASIC statement can take hours. Well, that's a little exaggerated, but ten minutes to find out you needed a semicolon instead of a colon is ridiculous. (Yes, I've done it. And I know the manual fairly well.)

Osdex is the answer. There are three different ways to find what you're looking for. In looking for the correct syntax for an output to console statement, for instance, I could go to the alphabetic listing and look up PRINT. Or I could look under MBASIC. There I would find command and functions listed alphabetically. I could locate the command listed under output to console or PRINT statement.

The only information that I would get from this is the exact pages I needed to turn to in my Osborne manual to find out how to correctly use the command. Glory hallelujah! For new Osborne users this book is a must. What I

wouldn't have given to have this available when I was first starting to use my 01. \$8.95, easily. Even now, after three years of dealing with that manual, I think I could still find uses for it occasionally.

There are separate sections for CBASIC, MBASIC, CP/M, WordStar, MailMerge, and SuperCalc. With these divisions it becomes easy to track down any command you need. WordStar commands can be looked up by choosing an appropriate function name like "save block." Or by the control code which activates the function, (control)KW. Why would anyone want to look up a function that they already know the code for? To do a "save block", you must first mark the block, then do the save (that is write it to disk). Before you can save it though, WordStar needs to know what you want to name the file. Then how do you remove the block markers? All this infor-

mation can be found in the manual, if you know where to look. Osdex tells you.

So if you aren't familiar with the user's manual (and maybe even if you are), this index is for you. It even comes in the same bright blue colors as the 01 User's Manual it goes with. I do have one complaint. The thing doesn't have an INDEX.

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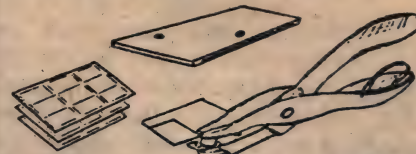
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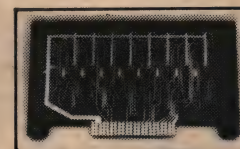
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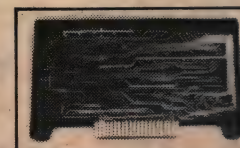
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by Karl H. Meyer

Many people have asked me why I set up a BBS for a special class of users, or why anyone would invest the money in the equipment or the time necessary to maintain it. Every Sysop has his own reasons, and they are as varied as the boards themselves. Some boards are of general interest, while others, like my own, are for a special purpose. Our reasons are as varied as the reasons why people buy modems to communicate with us, and we "do our thing" with our BBS's.

Thousands of computerists never add a modem to their basic equipment, others add modems for the primary purpose of communicating with

remote data bases such as CompuServe, The Source, or Dow Jones. Some buy modems at the time they buy their computers because they want to get into what has become, in this decade, the substitute for the CB craze of the 70's, and spend most of their time communicating with local bulletin boards. Once onto a local board they find lists of phone numbers of other systems, or they find the lists in Computer Shopper or other publications. This issue of Computer Shopper alone carries more than 700 BBS numbers. For the newcomer to the wonderful world of BBSing, the result can be disastrous to phone bills, as one caller to my board learned; his phone bill of \$765 in the first

month was greater than the cost of his computer and modem!

In my own case, I found a need for a BBS and filled it. As a writer who had happily switched from a typewriter to a word processor, I had worked with my computer for two years before I added a modem. At the time I justified the expense with the excuse that I was doing research for my books and articles at far less cost than sitting in libraries and traveling. This is still true.

My next use of communications with my micro was to transfer portions of a book with another author as we collaborated on a project. Although we both live in the same city, it was faster and easier to make a phone call and exchange chapters of that book than it was to meet face to face and swap disks.

When I began using local bulletin boards, and some not so local, I found two notices from publishers looking for people who wanted to write books on computer-related topics. My first reaction was that of all the BBS users I knew personally, none were writers. My second reaction was that thousands of other writers have switched to similar equipment, and many of them would also be getting onto a BBS. I had known of the LitSIG on CompuServe, but that is

devoted almost entirely to technical and computer-related writing. There seemed to be nothing available for novelists, science fiction writers, short story writers, and freelancers working general articles.

I decided there was a need, and established The Notebook for writers, editors and publishers. I judge its success by the number of nationally known personalities who use it. Doug Clapp, Columnist at InfoWorld; Lindsay Van Gelder of PC; Robert H. Vardeman, best-selling science fiction and western novelist; Christine A. Adamec and Rae Raskin are but two of the journalists whose articles have appeared in such publications as Ms, McCall's, Working Woman and Cosmopolitan are members. Don Lancaster and Cheryl Peterson, whose articles appear here in Computer Shopper are others, as are editors of more than a dozen publications who have left requests for writers, and who have been able to fill a need of their own through my BBS.

Any BBS will reflect the personality and idiosyncrasies of the Sysop who runs it, and mine is no different. It is devoted to writers, and has nothing to offer the caller who is looking for games and programs to download. About the most erotic thing to be found on The Notebook is a list of more than twenty-five publishers who specialize in romances, from the books for the pre-adolescent girl to the outright erotic adult romance. For some really exciting titila-

tion, there is a list of agents who specialize in arranging lecture tours for established writers.

The Notebook is on line 24 hours at (305) 686-4862, and welcomes writers of all kinds, whether previously published or not.

Some systems are established to demonstrate what the BBS software can do. The Infoex-80 BBS at (305) 842-2687 is the headquarters of United Software Associates, and serves the purposes of demonstrating the Infoex-80 BBS and handling customer support for all the products distributed by USA. In addition, the Sysop, John Burgan, is an aficionado of Orchestra 90, and his download section contains hundreds of Orchestra 90 files, which he rotates regularly.

Other systems have been established by retail stores, and carry notices of special sales, or new hardware and software. Some of these company-sponsored BBS's support E-Mail, some do not; some have download sections with public domain programs, or utilities of value to their users.

The vast majority of BBS's are free, but some charge a one-time or annual membership fee to help defray the cost of maintaining the system. Disks on a BBS get a great deal of wear and must be replaced more often than in many other uses; the dedicated phone line for a 24-hour system is never free; any micro running 24

Continued on page 140

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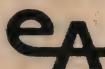


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Sysops Continued from page 138

hours a day needs occasional trips to the repair shop to keep it healthy. In addition to the financial outlay, there is the time involved in maintenance. In talking with Sysops around the country, I find that an hour to an hour and a half a day, seven days a week is about average for the time spent in adding new download files, cleaning up old messages to free disk space, to add users to the system, and in many cases

to verify new users. (Some systems allow a caller to add himself as a member; others require verification by voice or mail.) That time equals anywhere from one to two working days each week, paid at the rate of \$0.00 per hour.

Even on systems that require a fee to join, the small amount of money collected never makes a profit. If there is one BBS in the country that pays for its total upkeep, I have yet to hear of it.

Then why do we do it?

The reasons vary as much as the Sysops themselves. Lloyd Osteryoung, Sysop of Cecil's

Nite Owl at (305) 588-0487, started his BBS as a hobby when he retired. After his wife passed away last year, he found it a blessing to keep himself occupied. Cecil's Nite Owl was a night-time only BBS, but Osteryoung soon added a second board (Cecil Jr.) to serve a different class of users during the daytime.

Some Sysops set up their BBS's for users of a particular make of computer. In many cases they have found there is no commercially-available software to run a BBS, and they write the programs themselves. Many of these homebrew programs are excellent, and have been put on the market by the authors. Ralph Fowler's TIBBS at (404) 425-5254 is an example of a program that was developed by the Sysop for his TI 99/4A when Texas Instruments told him no such package was available and that it couldn't be done. (Don't ever tell a

devoted hacker something can't be done!) Fowler's system is unique in that it supports the TI voice synthesizer to send audible logon messages to callers. He has several blind users who appreciate that feature.

Pirate boards, of which there are hundreds, specialize in giving away programs that sell for prices up to \$700. For the cost of photocopying and postage from some boards, you can get a full set of documentation to go with it. One caller to The Notebook told me he had bought his computer and modem, but had never paid a cent for any software. He has several good word processors, terminal packages, data base managers, accounting systems and all the games he could ever want to play. He also has a full set of diagnostic programs for the TRS-80 Models III and 4 that have never been released to the public, but were intended for use in Radio Shack service centers by their technicians only. All of this was acquired at the price of a few phone calls.

One Sysop, who for obvious reasons shall be anonymous, admitted to me frankly that he set up his BBS for the sole purpose of getting as much free software as he could. In two years' time he has become one of the most notorious pirates in the business, and keeps thousands of copyrighted programs available on a 20 megabyte hard drive! He has a simple system for allowing you to download the programs: Send him programs which he does not have, and which

equal the retail value of what you want, and you're in business. (You're in the business of helping him defraud the copyright owners of thousands of dollars' worth of revenue every week!) Pirate boards like these abound, and cater to the person who builds huge libraries of programs he never uses, but simply wants to have free.

Dale Arnold's Coal Mine BBS at (502) 754-1390 came about when he discovered there were systems that could be used without charging access time. He also realized that there was not a single board he or others in his part of Kentucky could access without making a long distance phone call. As an engineer who has spent his lifetime working in coal mines, he designed his BBS to reflect the tastes of his local users. Some of the terminology on the board is lost to non-miners, and when you see sections entitled Open Pit, Tailings and Deep Shaft you might be misled as to the nature. Arnold evidently filled a need in his area, too, for after two months in operation he has three dozen regular local users who have shown their support by contributing enough money (unasked) to buy an extra disk drive to expand the system.

Jim Anderson's Most Significant Byte BBS at (406) 256-3813 is also the result of a Sysop's desire to provide a local service where none had been available before. When he

Continued on page 141

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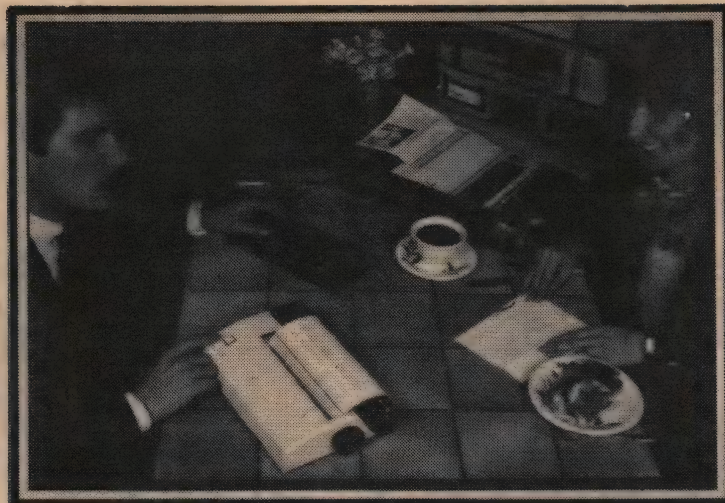
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visited us in West Palm Beach, Florida from his home town of Billings, Montana, he was shocked to learn that we could dial more than 30 local boards without dialing a 1 before the number.

The Sysop of one match-making service set up his board after a divorce. He wanted to meet some ladies who had similar interests to his own, and succeeded after numerous trips around his home state to meet what he called "some real weirdies."

The most common responses to my question, though, were, "It's fun," "It gives me something to do with my spare time," and "It's a way to meet a lot of nice people." I can agree with all of those. The agony of finding your board down whether at the hands of hackers or equipment and power failures, the time and expense involved, are adequately compensated by the people you get to meet. If you are the kind who enjoys chatting with your callers, you'll find you can make a career of typing back and forth all day and night. While I don't have as much time to chat as I'd like, I find it enjoyable to chat with someone who tells me, "Gee, I never thought I'd meet a human on one of these things!"

To get some idea of the differing personalities of the Sysops, just call a dozen different boards. Some are cold and impersonal, others like to play games with you. I logged onto one several months ago and was greeted with something like this: "Welcome to the BBS Adventure. You are standing in the middle of a BBS. To the East is water. To the West is an orange grove. To the North is a city of immense proportions. To the South is wasteland. Do you want to continue?" I answered with a yes, and found one of

the wackiest adventure-styled boards I've ever seen. I called the next evening and replied with a no, and the system responded with a "Coward!" before I was disconnected. For better or worse, the system has disappeared, but I have no doubt the Sysop had a ball while it was up and running.

In addition to the hundreds of BBS's listed here in Computer Shopper, several publications are of interest to anyone who wants to poke around and peek (sorry--just couldn't resist it!) at a wide variety of BBS's. I can recommend Mike Bane's book **The Computer Phone Book** (New American Library, \$9.95 at most bookstores), or Ric Manning's newsletter **PLUMB** (P.O. Box 300, Harrod's Creek, KY 40027, \$28.50 annually for 10 issues).

One thing all Sysops would appreciate, though, is that when you call let them know what you think of the system, and offer any suggestions for improvements. We'd also like to know where you found our BBS numbers. If you call any of the boards mentioned in this article, tell them you saw it in Computer Shopper. We all like to know who's supporting us. ●

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A producer of fine entertainment programs for the Commodore VIC-20 and Commodore 64 computers, has announced the release of its newest program, **KillerPiller** for the C-64. In an effort to gain substantial notice in the Commodore 64 entertainment software market, Castle Software is premiering **KillerPiller** at the spectacular low suggested retail prices of \$9.99 for the cassette version and \$12.75 for the disk version. When judged against other games in its class, one would expect **KillerPiller** to carry a price tag in the vicinity of \$24.00. Representing a new pricing breakthrough, the **KillerPiller 64** suggested retail figures have at last made a quality piece of recreational software affordable by virtually all those who would desire it.

The scenario of **KillerPiller 64** is that of a war between you, as a pestered pest eradicator, against hungry

caterpillars that are out to devour an orchard that you are trying to protect. The "Killerpillers" grow as they eat trees, faster and faster on each successive level. A hit in the body will cause one to split and, if you're not careful, you can end up with a really bad infestation! The **Killerpillers** lay eggs that hatch into two kinds of moths - normal and mutant - and they protect the munching **Killerpillers**. The two kinds of moths have vividly different attack methods that will combine to put your lights out fast!

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w/SpellRight Plus	\$ 79.00
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Mirage Concepts (40 & 80	
clm W/P with Dictionary)	\$ 95.00
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G/L, A/R, A/P, P/R, I/M each	\$ 69.95

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64 Forth	\$ 45.00
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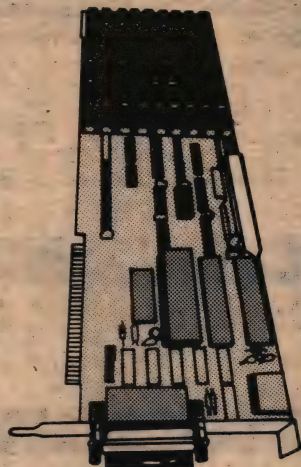
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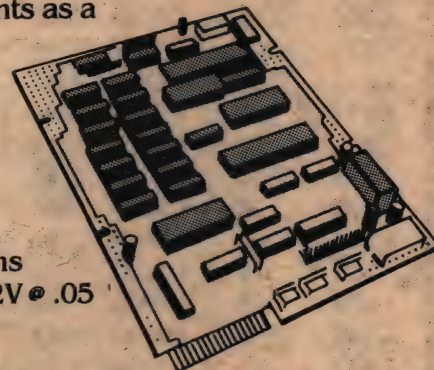
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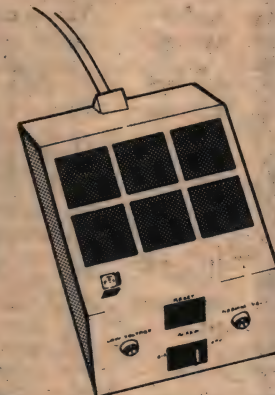


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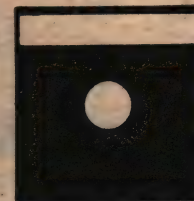
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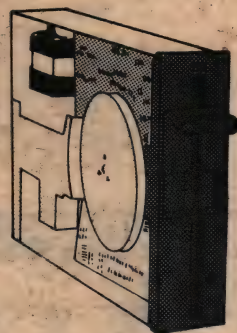
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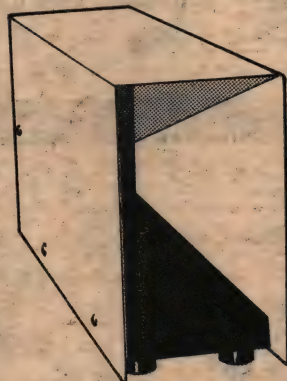
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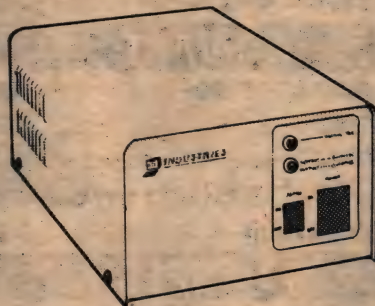
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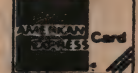
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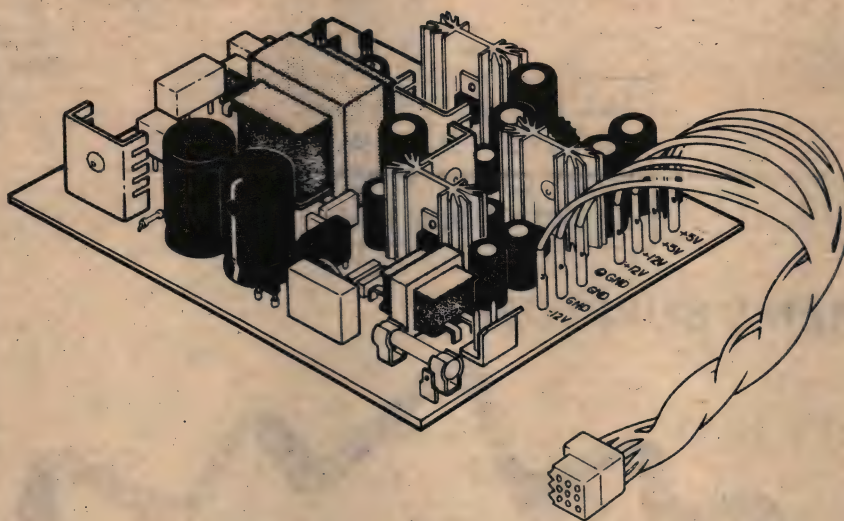
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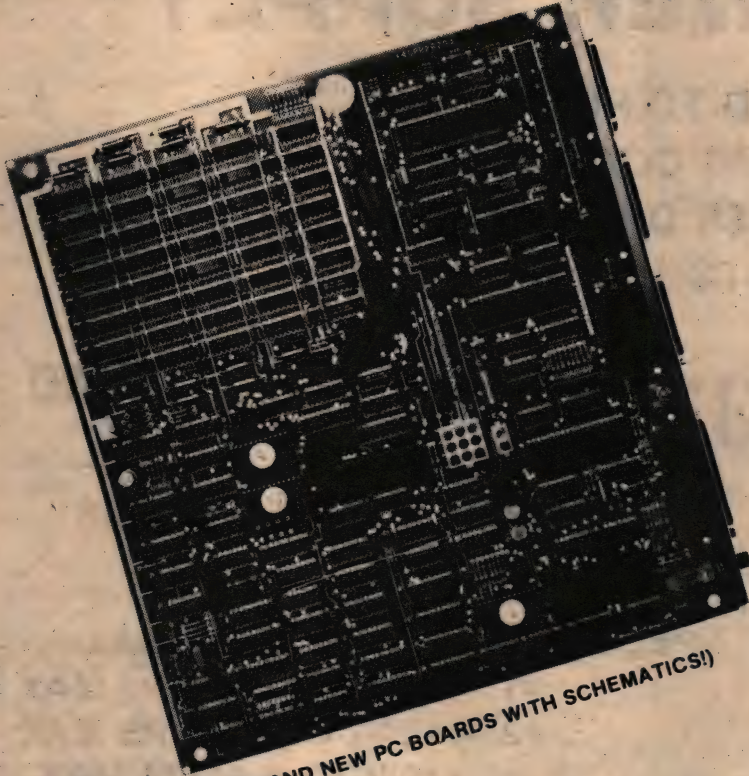
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Fortran For The Curious

by Clayton E. Houston

This is going to be an article on Fortran written to the home computer enthusiast who has a reasonable understanding of BASIC, i.e., knows the fundamentals and structuring of a program but has never been exposed to Fortran. Though this article will not go into depth on any one item it will expose the curious hacker to the mystique of Fortran. There are many good texts and users guides made for your particular system that will detail where the commas, brackets, etc. go to get their system to operate. I will try to relate BASIC and Fortran so you will be able to readily jump back and forth between the two language systems. Believe me, once you have one understood the other one is a snap!

Introduction

Fortran, as it's derived name implies, is a computer language intended for FORMula TRANslation of equations into useful number crunching programs. As you probably know, Fortran is a compiled system which converts the equation coding directly into machine language which can be executed at significantly higher speeds than the equations were crunched in normal BASIC systems.

I like to break the Fortran program to be designed into three (3) sections: front, main, and bottom. The main section is the part most anyone can follow as it contains the equations that we're interested in crunching. We usually try to make the coding using the same names as in the equation specifications to aid in checking out the computations at a

later time. The other two sections, the front and the bottom are the ones that usually create the problems. The front is where we declare the arrays in the dimension statements but also in what we call COMMON which is a shared section of memory that various chained subprograms use to transfer data back and forth. We also declare nonstandard variables as Integer or Real items. There are a few other things we do in the front section that we won't discuss as it's just for the "pros" who do serious number crunching. The bottom section is where I usually locate my write-out statements. You can actually write output at any time in the program since you usually output after you perform the calculations in general, it will be at the end. I like the format statements in one central location but a lot of programmers like the format statement right with the write statement.

As you noted above, there's something in Fortran input/output (I/O) called format statements. This is probably where most programming time is spent in the beginning, trying to debug the I/O. It's not quite this bad, but in Fortran you have to tell the computer exactly on what line, how many spaces over and what type of character will be read and written. I have noticed after twenty years of using Fortran, the I/O control statements are fairly second

nature. I'm getting where I can do them correctly after three or four times.

This then highlights what will be discussed in the following sections. These discussions I hope will not bore you with too much detail as most texts seem to do. This should provide the fundamentals of Fortran that the average person can look over to get familiar with how the language is used. As a side note and a personal issue, I wish text books and user manuals would lead us novices through their material at the highest level without trying to let us know every feature of each subject. Too much detail too early snows the student of the subject who usually loses interest in the material when it's usually simple. Programming in itself is easy. The difficulty comes when trying to grasp too many details on one aspect without knowing or seeing where these details fit into the total task of building a program. On with the show!

Arithmetic Expressions

In Fortran, there are only five (5) arithmetic expressions noteworthy. They are:

+ Addition

- Subtraction
* Multiplication
/ Division
** Exponentiation (Power)
(In BASIC the ** is .)

There is something called hierarchy of arithmetic of operation which means the order which operations are performed. This generally means that, if no brackets are used in the expression, the order will be 1) **, 2) * and /, and 3) + and -. To eliminate any worry about this hierarchy thing I just put brackets around everything. To show the simplicity of the operation the following equation is converted to Fortran.

$$Y = (A + B - C^D) / E * F$$

In Fortran,

$$Y = ((A + B - (C ** D)) / (E * F))$$

With the brackets used liberally I'm assured that the number crunching is done correctly. Without them I'd get the wrong answer because addition would have been done after the **, *, and / steps.

Now, when typing this in, you cannot start before column 7 or exceed column 72. If you need a longer line, you can put a non-zero character in column

6 of the next input line and continue with your long equation. While we're on the location of coding, it should be noted that the first five (5) columns are reserved for numbered labels. In BASIC you have a number for each line of coding. In Fortran, no line numbers are required unless you have some reason to route the computations to another area of the program like using a GOTO or IF in BASIC. This is the need for the numbered labels in Fortran. It can have any value, but the compiler will not accept more than one value of a label number so you should keep

Continued on page 148

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track of the label used to aid in program checkout later.

This brings us up to the subject of planning a little ahead by developing a crude flow chart. This does nothing more than to help you sectionalize your program, to eliminate duplication, i.e., using subroutines (GOSUBs in BASIC) and to assure yourself that you're going to end up with the end product you

desired. An example of the way I like to choose labels would be if I had sectionalized my desired program into six blocks, I'd make sure when developing labels all of the first block would use a 100 series value, the second section a 200 series, etc. with a 1000 series for the bottom end, format statements. It helps when using some high class editors in the search mode to find the area of interest quickly. Just a

reminder, the label values can be of random selection but systematic selection will aid you later.

Control Statements
The control statement basically consists of IF, GO TO, DO, PAUSE, STOP, and END. The easiest one is the END statement which is placed at the end of the program just to let the compiler know it has all of the program, so compile! The PAUSE and STOP statements are placed within the program starting at Column 7 and when executed does as advertised. It usually is a crutch for checkout but on very complex programs a STOP may be desired when some logical relation has occurred. It'll do just that. Now the good

ones! The DO statement is just like the FOR-NEXT loop in BASIC. The form is different. The form usually will not allow starting with zero (0) or using negative (-) steps. Very seldom do I use steps so we'll ignore it here. An example of a Fortran DO loop is,

```
Col -> 1 567          72
      DO 127 I = 1,25
        X(I) = I ** 3
      127 CONTINUE
```

This says to do-to Label 127 for I equals one to twenty-five times. The calculation of cubing I and storing the value in a previously declared array of X in positions 1 to 25. It's not

complicated, but the form is very precise. You must create a Numbered Label in this case the value "127" for the loop to operate within. The label must be located in Columns 1 through 5 as mentioned earlier. The DO to 127 operation proceeds until the label 127 is encountered at which time the processor jumps back to the start of the DO loop and continues until the I = 25 is satisfied. At this time it branches over the jump-back-to command. Not to digress too much, but it's not a good practice to use the label of a DO loop for any other purpose as there is an inherent jump back command tied to the bottom of a DO loop.

The next biggie control statement is the IF. The IF is used almost like it is used in BASIC, but the form is different. The form is the IF, followed by brackets containing the comparison directions, followed by the processing instruction if the comparison(s) within the brackets is TRUE. An example of this is:

```
IF( A.LT.B) GO TO 901
```

The Rational operators are enclosed within the periods (.) and can usually be remembered easily. This .LT. stands for Less Than. The following table lists the operators:

- .LT. Less Than
- .LE. Less Than or Equal to
- .EQ. Equal To
- .NE. Not Equal to
- .GT. Greater Than
- .GE. Greater than or Equal to

You can also have logical operators listed below which are self explanatory:

.AND.
.NOT.
.OR.

They are used to combine, for example, two Relational operators each of which results in a true or false flag and apply a logical to those flags. An example is:

```
IF(A.LT.B.AND.C.GE.D)GO TO 901
```

In this instance A must be less than B and C must be greater than or equal to D to execute the GO TO 901 statement. The use of the IF statement allows you to route the computations through different subsections of your programs based upon logical relations you compute.

You saw the use of the GO TO control statement. It says to immediately go to the label value noted which can be before or after the current location within the program. Another form I use a lot is the COMPUTED GO TO control statement. I like to use this when I want external routing control to different and unrelated sections of the same



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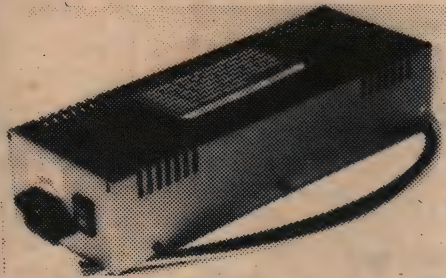
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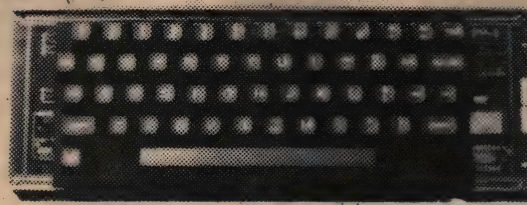
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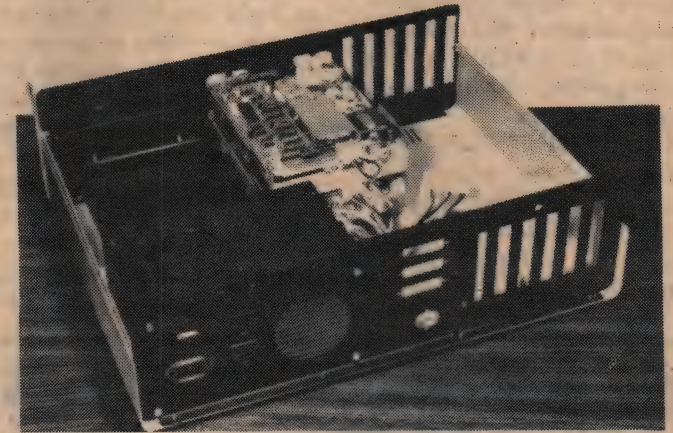
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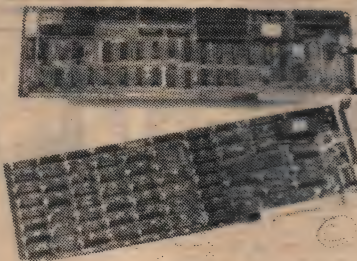
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program. In this example, I input the values of K=4 from the keyboard and the control statement.

GO TO (42, 26, 35, 24, 59), K jumps the process to the label noted in the 4th position, namely to Label = 24 (only integer/whole numbers can be used). If you inadvertently input K = O or K greater the five in the case, some compilers will cause the calculations to "blow-up" while other compilers will allow the processing to pass to the next line making your tracking down of your mistake difficult.

I guess CONTINUE is also a control statement. As you noted it is the bottom of a DO loop. It can also be used with a label just as a place for the program to jump to and it

doesn't cost you any bytes of memory to use it that way.

The last control statement, RETURN is always associated with a subroutine or function call which I'll discuss next.

Subroutines and Functions

The subroutines is generated by the form CALL. The need for the subroutine is generated by the desire to conserve program space. It is usually only worthwhile if calculations are duplicated several times within the program and it is practical to extract these like statements, combine them into one common set of calculations and call to this common set of equations multiple times. For example, in an accounting program you might compute principle and interest at six different locations. By removing each of the six sets of like calculations and replacing each with a one line "call" to a subroutine, you can save almost five sets of computer lines and reduce the space required for the

program.

Before showing an example of the subroutines use, let's discuss the form. It's usually something like:

CALL BURP (A,B,C,X,Y,Z)

And the other end of the "call" is the subroutine itself which is a form like:

SUBROUTINE BURP (D,E,F,U,V,W)

RETURN

In general, we pass data back and forth using the items or symbols in the parenthesis. This simple illustration above could indicate that we have three variables A, B, and C that we pass to "BURP" who calls them D, E, and F values with answers called U, V, and W returns them to the main program where they're called X, Y, and Z variables that are used in the remaining program. That's basically all there is to a subroutine call. It is important to note that the calling arguments A, B, C, X, Y, and Z are position sensitivity with the receiving arguments D, E, F, U, V, and W. Six items are passed, six are received and six are returned after being processed. This illustration was for three input and three output items. You can have 1 and 5, 5 and 1, 10 and 10 or almost anything you want as long as you pass the items back and forth using the same position. In reality, the routines only pass the starting address of the storage location of the parameter (or array). That's why you can switch item names in the subroutine and use a completely different set of item symbols.

The FUNCTION is a lot like the subroutine. The compiler has many functions which we use without second thought; things like ABS, COS, SQRT, and LOG used in writing and

equation such as:

A = ABS (B)

reflecting A is equal to an ABSolute value of B.

If we desire to generate our own function called INTERP that performs some great mathematical number juggling such as a data table interpolation, the form might be to pass to the function the X value of a table, the table number, NUM and output, the results of the lookup, which we would equate to Y. The form would be:

Y = INTERP (X, NUM)
with the receiving function form like:

FUNCTION INTERP(X1, NUM1)

RETURN

I don't see a lot of difference in the concept of the subroutine and the function. The form is different and the function using form is a lot simpler to follow.

Writing The Main Program

When coding the main program, I tear off two pages of paper and title them Front and Bottom. I keep them handy for when I create a need for an array or common or output format; I note it on the appropriate Front or Bottom sheet. To build a program you initially need a plan; the "pros" call it a specification. So we'll make one up.

Let's say you want to buy a house and you need to know at a glance what your monthly mortgage payments will be when the realtor says 12 3/4 % with \$20,000 down on this \$150,000 house. As there are so many combinations of loans, interest rates, years financed, let's make up a table that lists all the values. Our requirements are that on one page we list the monthly mort-

gage for a range of loans between \$100,000 and \$150,000 in \$1,000 increments for interest rates from 8% to 16% in 1/2 % increments. Each page is to be presented for a single time of financing. We also want finance times from 10 years to 30 years in 5 year increments.

Well, step one must always be to find the method of doing the calculations. My little math book gives us an equation,

$$M = \frac{Pi}{1 - (1 + i)^{-n}}$$

M = Monthly mortgage payment - \$

P = Principle or loan value - \$

i = Monthly interest = i/12 - %

N = No. of payments = Years * 12 - mo.

In our crude flow charts we can envision three DO loops; one on N (years), one on P (principle), and one on i (interest) desiring to store values in arrays until we're ready to print them out. (Actually we could arrange the output so we wouldn't have to store it but you'd miss some of the fun.) In structuring this problem we would first set the value of YEARS which sets the first N value. This would be the outer loop. Next we would pick a loan value (P) and hold it constant while we run through a bunch of interest rates, the latter being the inner loop. I propose to use a technique to initialize the values of YEARS, PRINCIPLE, and INTEREST and then bump them up the desired increments each time

Continued on page 151

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we go through a loop using a loop counter to perform the right amount of calculations.

A study of the specs show the number of times we go through each loop to be,

```
YEAR loop = 5
PRINCIPLE loop = 51
INTEREST loop = 15
```

With all of this grand plan in memory (yours) we can take a first cut at the coding.

```
Col ->1 567 72
WRITE(IO,1000)
YEARS = 5
DO 120 L = 1,5
YEARS = YEARS + 5
WRITE(IO,1001) YEARS
N = YEARS * 12
P = 99000.
DO 110 K = 1,51
P = P + 1000.
R = 7.50
DO J = 1,15
R = R + DELRATE
I = R / 12.
M(J) = (P*I)/(1. - (1. + I)**(-N))
100 CONTINUE
WRITE(IO,1002) P, M
110 CONTINUE
120 CONTINUE
```

Now go back to the front section and write,

```
REAL M(15), I
INTEGER YEARS
DATA DELRATE / 0.5 /
```

After this you can go to the bottom section and write the input and output formats:

```
1000 FORMAT(1H1, 20X, 'MONTHLY
MORTGAGE PAYMENTS')
1001 FORMAT (1X, 20X, 'FINANCED
OVER',12,'YEARS'//)
```

```
1002 FORMAT (1X, F7.0, 3X, 15F7.2)
```

By the way we've left out a little line of output which we'll pick up later to illustrate a point. OK, now that you've followed the program on "blind faith" let's go back and discuss various items within it.

Building The Front Section

The first thing to discuss are the words REAL and INTEGER that we put in the front section. A general rule in Fortran is that any symbol, character, word, etc., beginning with I, J, K, L, M, and N are automatically integers or what you think of in BASIC as whole numbers.

The other symbols beginning with A through H and O through Z are used for floating point numbers or those having decimal points. As you have figured out by now, we can override this convention by "declaring" at the beginning of the program that certain variables are not integers as their symbols indicates (M and I in our program) but should be treated like real numbers with decimals. Conversely we can declare standard floating point symbols (like YEARS) as an integer and not use any

decimals with it. Notice in the form of declaring REAL and INTEGER that there is a comma(,) between each item and nothing at the end of the line. This is typical. If you should put a comma after the last item, the compiler would expect another item and bomb-out.

Normally, if we wanted to declare an array as we do with the M symbol, we would write:

```
DIMENSION M(15)
just like the DIM in BASIC. I assume you know enough about the programming to realize that an array declaration like that above is just a way of telling the compiler to save 15 pigeon holes because you may have up to 15 numbers to save or store for later use.
```

The data statement can be

used for a variety of purposes but generally is used to initialize symbol values. We elected to put the percentage increment (DELRATE) in as a data statement to illustrate the form and the procedural use which is significantly different than in BASIC. In Fortran the word DATA is followed by one or many symbols which are followed by the data values enclosed in a pair of "slashes" (/---/). When multiple symbols are used, each must be separated by a comma (,) and the multiple data values also separated by commas. It is important to note that for each symbol there must be a data value or the compiler will bomb-out again. (You do not have to do a bunch of READs like in BASIC to load the data values into an array. This automatically is done at the

run time.) You can put data into arrays with the DATA statement also.

Let's use for example we want only the interest rate (R) in our program computed for four odd-ball values instead of the very convenient 1/2% increments. Let's say 7.93%,

8.45%, 10.625%, and 12.385%. First we'd declare an R array of four followed by a DATA statement and use the J loop counter for the R array.

Continued on page 152

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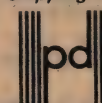
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The additions to the program would look like:

```
DIMENSION R(4)
DATA R/ 7.93,
8.45, 10.625, 12.385/
```

The program coding would be changed to look like:

```
WRITE-----
```

```
DO J = 1,4
I = R(J)/12.
M(J) =
```

```
END
```

A word of caution; if you should ever write into, for example, the R(1) symbol, the data stored will be that value if you ever send the program back to re-initialize the data array. Think of it as a way of preloading values once and the only way you can get back to them is to re-run the whole program just to be safe.

Here comes one of the more messy ones to implement; easy to understand but hard to implement, namely COMMON. Common is a bunch of two sided pigeon hole storage locations to pass data from the main part of the program to a subroutine. You may elect to use that method or the subroutine argument method. I really have a hard time justifying subroutine arguments over common. Subroutine can be compiled independently or may already exist on the system so it would be pointless to try for the common.

In BASIC there is no COMMON; you must limit yourself

to using the same symbols anytime you GOSUB. In Fortran using COMMON you can change the symbol names between the calls or not. I still like to imagine the big two sided pigeon hole storage locations with the main program name taped on one side and subroutine names taped on the other side. The number that is put into one end is the same value at the other end; the name may be different. You've probably gathered that the pigeon hole concept implies that COMMON procedures are position sensitive just like it was in the subroutine arguments. (As with the subroutines, the reality is that you only pass the starting address of the variable or array.)

Let's go back to our SUBROUTINE BURP where we passed A, B, C, X, Y, and Z back and forth. If we'd used COMMON the program form would look like:

```
COMMON A,B,C,X,Y,Z
```

```
CALL BURP
```

```
END
```

```
SUBROUTINE BURP
```

```
COMMON D,E,F,U,V,W
```

```
RETURN
```

Usually, we call subroutines and force our input into its format as the routine is available from some standard source and does just what we want it to do. Why reinvent the wheel when the one available was developed by experts and is probably very efficient computer time-wise. Usually stock routines from the computer

manufacturers are pretty efficient if they do the task that needs to be done.

There are some other items as EQUIVALENCE where you can set one item or array equal to another one and save on program space requirements but you can study that in one of those detail texts.

Now for the final part and most difficult to get just right, the bottom or output section. Building The Bottom Section

As I said earlier the bottom section contains the write statements and the form or format statements of those output statements. In our program we had three (3) write statements. Each presented a slightly different format; one a straight print of a title, one a print of a title plus data, and one an array output. All did, however, fall into the same form, i.e., the word WRITE followed by the logical unit number to be written to and the format label number, both enclosed in brackets; and then the parameter(s) to be written out. An example of this is:

```
WRITE(IO,1001) YEARS
```

(Remember we set the IO equal to the output logical unit number in our program.) In our program we know that this would write out the value of years financed on the second line, but we want the value stuck in between some words, so here's what happened. We put the label number (1001) in column one to five. Then the word FORMAT in column 7. Then enclosed in brackets we specify:

```
First character (printer line control) = 1X
```

```
Skip 20 spaces = 20X
```

```
First title = 'FINANCED OVER'
```

Space for two digit integer YEARS = I2
Second title = 'YEARS'
Skip two lines = //

```
1001 FORMAT
(1X,20X,'FINANCED
OVER',I2, YEARS//)
```

This format stuff is actually easy; it just takes concentration on details to get it done correctly the first time. The "pros" usually make a couple of mistakes but they're easy to find and fix.

There are many other format forms. The floating point in our 1002 format is 15F7.2. This means that we'll print out 15 numbers in a floating point (F) form having a total of 7 digits with 2 digits after the decimal point. If we would have wanted to skip two spaces between each number we could have written 15(2X,F7.2) instead.

The only other descriptor that gets a lot of use is the "A" which handles what they call Hollerith characters. I call it the alphabet descriptor because it's the form you use if you write-out a computed letter. Beyond this you ought to look at one of those text books for the many other forms.

Earlier I mentioned that we left out a line of coding. I just know that you have noticed that we need to label each column on our output with the interest percentage used in the calculations. By now I know that you're way ahead of me but I'll show you anyway. First we'll need to save that percentage rate (R). To do this

everywhere "R" is shown we convert it to an array R(J). At the front end, we write DIMENSION R(15)
Then just after the "100" label and before the big write-out statement, we make a statement,
IF(K.EQ.1)WRITE(IO,1003) R
and have the format statement to look like,

```
1003 FORMAT(1X, 10X, 15F7.2 /)
which should align with the
columns and leave one line
space before the big list. Notice
how easy it was to align by just
adding the 3X,F7.2 of Format
1002 and calling that 10X in
1003. You probably want to
identify the row so within the
10 character spacing you can
write the 7 character word,
percentage as,
1003 FORMAT(1X,
'PERCENTAGE', 3X, 15F7.2
/)
```

Now we have the perfect program! (joke)

The Recollect

As I grew up on Fortran on main frame computers I took for granted that all computer languages were fast in execution. Then I ran into BASIC on the home computer. I just accepted it because the only alternate was Assembly language which I only use as a last resort. The problem is not the Fortran or the BASIC language but the word "compiled" language. Fortran is compiled or converted into machine language which runs very, very fast. Normal BASIC looks up the machine language each step of the way. You might say it is continually compiling your program as it crunches the numbers. This is what slows it down. It has its advantages but speed is not one of them. I discovered FORTH for my home computer. FORTH is a compiled language and runs at machine language speed. I've actually had to put delay loops in some of my routines to slow them down. The word compiled means so much in so many applications.

Up to FORTH I dreamed of the day when they'd come out with a Fortran compiler for my home computer that I could afford. I was thinking of the speed of execution and not the form of the equations. In recent days, BASIC compiler has marketed. Several look real good. With this facility available, the main objection of Fortran over BASIC will disappear. As you noticed I'm sure, the form of the program between BASIC and Fortran are not significantly different, in fact, for practical purposes they're identical. I figure in the future with all of the compilers available, it'll just become personal preference what language you use because speed and efficiency will be handled in the compiler itself.

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Before you start flying, you can choose to practice or to play the Mail Pilot game. The practice flying option lets you take off, navigate the plane, and then land. You can choose clear weather, windy conditions, landing practice or instrument flight rules (low clouds) with this option. The Mail Pilot game requires that you load your plane with mail and your calculated fuel requirements, taking into consideration the weight of the load, and then deliver to various airports. This game has student, private, senior and command pilot levels. You can

choose one of these difficult levels. Both the practice flying option and the Mail Pilot game let you fly in one of the following states: Kansas, Washington or Colorado. Kansas is a good state for beginners since the land is flat, and two of the airports have long, wide runways. Colorado, on the other hand, has its airstrips tucked within the Rocky Mountain Valleys, and is therefore intended for more advanced players.

When the game begins, a map of the state and its airstrips is displayed. Upon completion of a flight from one airport to another, the route taken is plotted on the map so that you can compare it with your original flight plan. Next,

the flight screen is displayed. This screen is divided into two parts. The top half basically displays a cockpit view, but with the actual plane visible. Airports are black, farms are grey, and mountains are white. Occasionally, a white VOR tower appears, which emits radio signals used for navigation. The bottom half of the screen contains various flight instruments. These consist of an altimeter, a speed indicator, a horizon/attitude indicator, a throttle indicator, and four digital readouts of pitch, degrees of flaps, direction and climb. A fuel gauge,

Continued on 154

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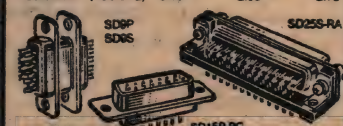
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Solo Flight Review Continued from page 153

status lamps, two VOR readouts and an ILS system, which tells the condition of your landing approach, are

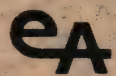


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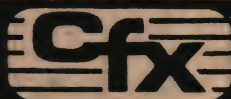
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also displayed. You can change the throttle, lower or raise the landing gear, apply brakes, control the flaps, and create a simulated emergency equipment failure with single keypresses.

The takeoff is relatively easy. As your plane rises above the runway, its shadow appears to add to the realism. During flight, you can use the



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See Page 86.

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VOR meters to find your destination points. On the advanced skill levels, flying becomes more difficult, as instruments can malfunction and serious weather conditions can develop. Flying through a cloud will block out your display screen, and you will have to navigate with your instruments until you are through the cloud. The landing is the most difficult part and success requires much practice. If you land at too steep of an angle, or if you miss the runway, the game will end. Carelessness, as in forgetting to lower your landing gear, can also cost you the game.

The three-dimensional graphics on the top half of the screen are attractive and realistic during takeoff and landing. They are most ap-

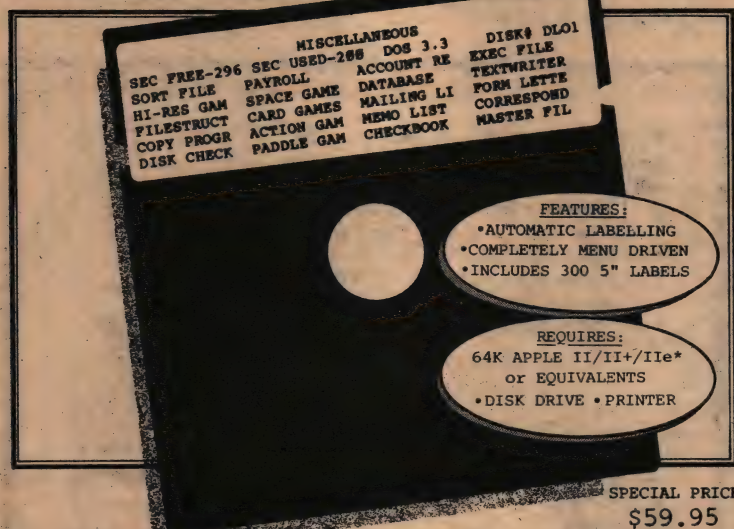
preciated when reaching an airport as you see the actual landing strip approaching. You can turn your plane around the airport and see the entire display move accordingly. By using the arrow keys, you can instantly look out your left, right or back windows and see the appropriate view. During the actual flying, with the exception of a passing cornfield, the screen is often dull. A greater number and a more interesting array of ground sites would have made this program even more exciting.

The instruction manual contains helpful takeoff and landing advice. It describes instrument flying, crosschecking of instruments and VOR navigation. The manual describes several types of approaches with helpful diagrams and

teaches you how to design your own approach. The instruments could use a more extensive description than is in the manual. Thus, you might have some difficulty in understanding them if you are not familiar with the terminology. Aside from this, the overall content of the documentation is very good.

Solo Flight is an excellently designed flight simulator. In addition to being entertaining, this simulation is extremely educational, since the controls and outcomes of maneuvers are realistic. It is apparent that much effort has been put into the creation of this program. If you have ever had the slightest desire to fly a plane, you will find Solo Flight to be enjoyable and educational, as well as a safe alternative. ●

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It's the age-old struggle of man versus machine with two of the newest Atari home video game releases: Robotron: 2084 and Berzerk.

Robotron: 2084 takes the player into a futuristic world in which advanced robots have turned on their human creators, determined to destroy humanity. Robotron's robots attack in waves, with different models of enemy androids in each wave. Players score points by destroying robots with a laser gun and by touching humans, thereby transporting them to safety. If the humans

are tagged by a robot, however, they become deadly to the player, and he must avoid them.

Dual controls are a special feature of Robotron: 2084. The player must set both joysticks or controllers in a plastic holder included in the game package to use the left joystick for maneuvering while firing at the robots with the right. For a two-player game, the controllers are traded between players.

The robots don't get any friendlier in Berzerk, which uses built-in voice capability to

alternately taunt and warn the player. The setting is an empire of mazes in a world of robots. The object of the game is to destroy as many robots as possible as the player moves through the mazes.

A special hazard in Berzerk is the invincible Evil Otto, a bouncing, smiling face that follows the player, seeking to destroy him.

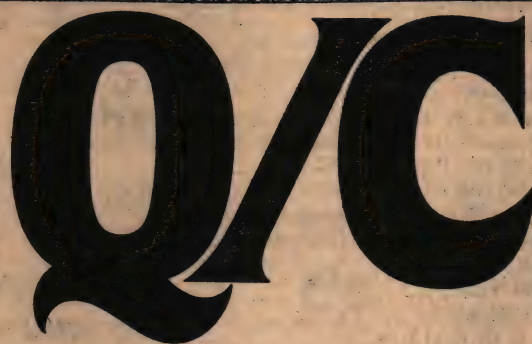
The built-in voice feature in Berzerk provides cues to players, such as a loud, "intruder alert" when Evil Otto is about to make an appearance. But escape to another maze before all the robots are destroyed, and the voice challenges, "Chicken! Fight like a robot."

Points are scored in Berzerk when robots are destroyed. Special bonus points are available when the player does "fight like a robot" and destroys all robots in a maze before moving to the next.

Berzerk was made available in January for the Atari 5200(tm). Robotron: 2084 was also made available in January for the 5200 SuperSystem and all Atari Home Computers for \$40.95 and \$49.95 respectively.

For more information write or call Atari Incorporated, 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086, (408)745-5312.

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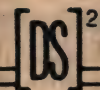
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Pascal, BASIC And FORTH A Viewpoint

by Thomas Miller

After reading numerous articles and advertisements of the above languages I was curious as to which of the above languages was the most "user friendly", "easy to learn", or "simple to debug." Additionally, I was wondering just how fast is PASCAL or FORTH compared to a common interpretive BASIC. In that some budgetary restraints were imposed, I sought the least costly of these languages to be hosted on my Northstar Advantage operating under Northstar's CP/M 2.2. I already had the Northstar BASIC operating under the Northstar DOS and needed to obtain the other two languages to not only act as a tutorial in these languages, but also to explore their respective strengths and weaknesses. I selected JRT PASCAL 3.0 and MICROMOTION FORTH 79 version 2.0 as the most practical for my purposes. After numerous hours compiling PASCAL source files and debugging same, as well as, learning the ED.COM to edit the PASCAL source files, I began to feel comfortable in writing simple to moderately complex programs.

The initial learning experience with the FORTH 79 was also somewhat tedious, but not for the same reasons. The key difference was that PASCAL follows traditional programming guidelines and any one who has had a programming course in FORTRAN, C, or structured BASIC could adapt to its syntax requirements. FORTH 79 requires the programmer to rethink his traditional approach to compiling and even writing his source code. It also would help if the programmer was familiar in Reverse Polish Notation (numerical entry as used on Hewlett Packard calculators). Once I overcame these handicaps (even just a little) the learning experience in the FORTH 79 language progressed much more rapidly. The FORTH 79 user's manual was much more tutorial than the JRT PASCAL user's manual, on the other hand, the JRT PASCAL user's manual and discs provided more useful examples and functional programs to be entered and/or

adapted for ones' own use.

My experience in writing reasonably sophisticated and useful programs in interpretive BASIC led me to compare my development time and the resulting programs speed of execution, as well as the ease of modifying and or debugging program/syntax errors in both PASCAL and FORTH. The development time for the FORTH programs was much shorter than the PASCAL development time for two reasons, 1 - the FORTH 79 came with a full screen text editor embedded in the FORTH for ease of program development, allowing rapid access after a LOAD (compilation of a FORTH screen) when compile time errors were noted, 2 - the FORTH 79 allowed compilation by screens with a very rapid compilation time, thereby allowing the programmer to debug segments of his program without compiling the complete program at one time. It should be noted that JRT PASCAL does allow compilation by segments, by dividing the program into external procedures which can comprise various size modules of the final program code and not be limited by the memory free space due to its virtual memory management. This is a definite "plus" feature found in the JRT PASCAL. The only major limitation was in the program development time for the PASCAL, i.e., the accessing of an editor (any editor ED.COM, WS.COM, etc.) for program edits and the extensive compile times (apparently improved upon in their latest release of JRT PASCAL 4.0).

Comparing the above noted languages to Northstar BASIC for ease of learning, simplicity of finding and correcting program/syntax errors, and user friendliness, I'm partial to the interpretive BASIC. The two main reasons being, 1 - no compilation phase to execute, and 2 - ease of editing the source code with the embedded line editor in BASIC. Although BASIC does not have the strict structural requirements of PASCAL for the novice programmer to learn good programming techniques, it is relatively easy to master a high order language.

In that all of these programs

are interpretive at some point, i.e., BASIC is interpreted from its source, and PASCAL and FORTH 79 are interpreted after compilation, I felt a reasonably accurate comparison could be accomplished on one Z80A based microcomputer to note the inherent differences. The use of a benchmark program referred to commonly as the Eratosthenes Sieve was used to provide a reference on speed of integer math (the calculation of the number of prime numbers between 1 and 8192). The table below summarizes the results

with the times being approximated, in that, a real time clock was not part of the system I benchmarked these programs on.

language	sieve run time	number of code lines
Northstar		
BASIC	3:40	19
JRT		
PASCAL	:45	30
MicroMotion		
FORTH 79	:07	12

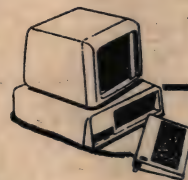
A listing of the source code used for each run is listed at the end of this report for comparison.

As one can note the fastest

execution time was FORTH 79 at approximately 7 seconds. The number of code lines is also the shortest for the FORTH 79 source code, though its readability leaves something to be desired. Note that the code lines in the FORTH sieve program with parenthesis are not counted as part of the executable code lines, in that, they are not compiled into the FORTH

Continued on page 156

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Pascal, BASIC And FORTH Continued from page 155

vocabulary (they are comment lines).

It has been stated that all programmers on the average will write the same number of code lines per working day regardless of the language they are programming in. If this is true, then the most efficient programming language based on the example sieve programs noted herein is FORTH. The major disadvantage in FORTH programming, besides the learning of Reverse Polish Notation in its stack manipulation is the fact that insufficient standards have been established at the industry level to provide a universal FORTH for all users. This is not to say that progress is not being made in that direction.

FORTH 79 (MicroMotion)

```
(SIEVE BENCH MARK ALGORITHM)
8192 CONSTANT SIZE
VARIABLE FLAGS SIZE ALLOT
(ERATOSTHENES SIEVE FOR 1899 PRIME NO.S)
: DO-PRIME (ALGORITHM IN FORTH)
  FLAGS SIZE 01 FILL
  0 (PRIME COUNTER) SIZE 0 (RANGE)
  DO FLAGS I + C@ (PRIME?)
    IF I DUP + 3 + DUP I +
      BEGIN DUP SIZE <
      WHILE 0 OVER FLAGS + C! OVER + REPEAT
      DROP DROP 1 +
    THEN
  LOOP . " PRIMES" ;
```

JRT PASCAL 3.0

PROGRAM SIEVE;

TYPE

F = ARRAY [1..8193] OF INTEGER;

VAR

S,P,K,I, PRIMECNT : INTEGER;

F : ARRAY [1..8193] OF INTEGER;

BEGIN

WRITELN('SIEVE START');

PRIMECNT := 0;

S := 8192;

FOR I := 1 TO S DO

BEGIN

F(I) := 1;

END;

FOR I := 1 TO S DO

BEGIN

IF F(I) < 0 THEN

BEGIN

P := I + I + 3;

K := I + P;

WHILE K <= S DO

BEGIN

F(K) := 0;

K := K + P;

END;

PRIMECNT := PRIMECNT + 1;

END;

END;

WRITELN('PRIMES = ',PRIMECNT);

END.

NORTHSTAR BASIC

10 PRINT "SIEVE PROGRAM"

20 DIM F (8193)

30 S = 8192

40 C = 0

50 FOR I = 1 TO S

60 F(I) = 1

70 NEXT I

80 FOR I = 1 TO S

90 IF F(I) = 0 THEN 170

100 P = I + I + 3

110 K = I + P

120 IF K > S THEN 160

130 F(K) = 0

140 K = K + P

150 GOTO 120

160 C = C + 1

170 NEXT I

180 PRINT C, "PRIMES"

190 END

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Vertex Systems, Inc. announces the release of 80MATE, a CP/M-80 emulator utility and 80TERM, a terminal emulation program. Most CP/M-80 programs can be run on PC/MS-DOS micros without the need for expensive co-processor boards. CP/M-80 programs run with 80MATE use existing CP/M commands. 80/MATE is safe to use with hard disks and is priced at \$99.50.

80MATE joins the Vertex Systems' family of innovative

micro-computer products, including Xeno-Copy PLUS, IMPORT! (DEC Rainbow), Xeno-DISK, Extend-A-Cord, and the original Keyfixer.

Easy to use, 80MATE uses ordinary PC/MS-DOS disks and devices. The unprotected CP/M-80 program is transferred to a DOS disk. 80MATE is run and the CP/M-80 program is "booted" and operates as though on the computer it was written for. CP/M programs can be transferred using conventional serial file methods; however, Vertex Systems suggests using the popular Xeno-Copy PLUS format conversion utility when speed, accuracy, and convenience is required.

Vertex Systems fully supports end-users and dealers with technical help. 80TERM may be necessary for several selected programs to match the display characteristics to the new host computer and is priced at \$44.95. Both utilities will be available through normal distribution and retail outlets.

Vertex Systems, 7950 W. 4th Street, Los Angeles, CA 90048. (213) 938-0857.

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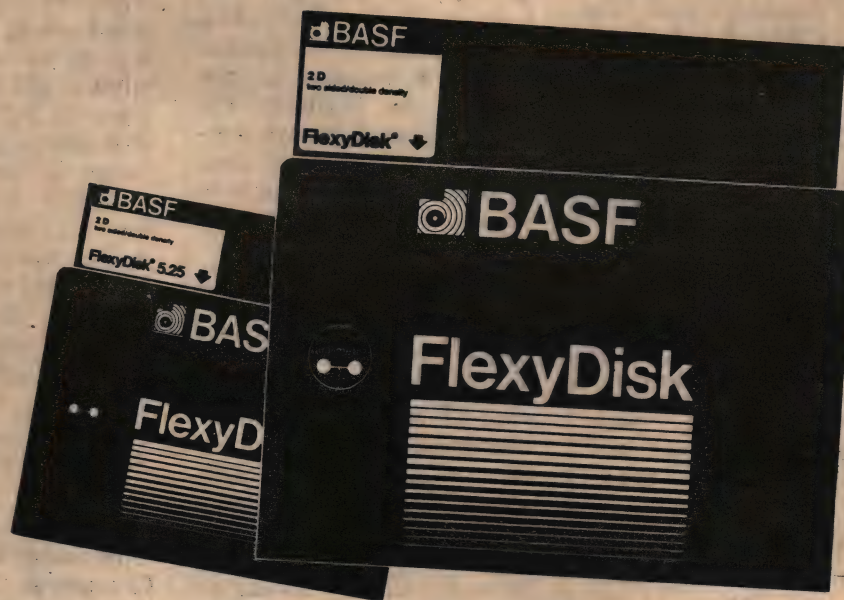
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PolyMorphic Systems Releases Business Computer

With features including Intel's advanced 80186 and Digital Research's new Concurrent CP/M-86 (v 3.1) with its' PC-DOS compatibility, PolyMorphic Systems has announced the release of the Poly 8/16, the first of their new

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family of S-100 Multi-user, Multi-processor computers for business. The Poly 8/16, along with the rest of its product family, is designed to give business the flexibility and power to meet today's computing requirements along with the growth options to be assured of meeting tomorrows.

The single user, dual processor Poly 8/16 features a two board set which includes an 8 bit industry standard Z-80 processor with 64K of RAM running CP/M-80 on the system Master card plus a highly integrated 16 bit 80186 (8MHz) with 256K of RAM (expandable on board to 1MB of RAM when 256K RAM chips become available) running the multi-tasking Concurrent CP/M-86 operating system on the Slave board. CP/M-86 gives users access to thousands of readily available application packages. Concurrent CP/M 86 (v 3.1), with its' multi-tasking features, built-in windows function, and full PC-DOS compatibility allows business to take advantage of

the power and performance which 16 bit technology allow while offering the ease-of-use that business demands. UNIX was to be available on the 80186 in mid 1984. Concurrent CP/M 86, PC-DOS, and UNIX give users a choice of a wide range of software options available both today and tomorrow including access to application software available for the IBM PC and PC XT. In addition, Digital Research's GSX graphic extension is included standard on the Poly 8/16, giving business access to a wide range of business graphics applications.

The use of the highly sophisticated 80186 along with Concurrent CP/M 86, PC-DOS, and UNIX is in itself a major step in PolyMorphic Systems goal of meeting businesses multi-user computing needs. However, the real key to their products is the upgrade path which they allow. They are able to update systems which have been installed since 1977 to the latest in 16 bit technology by simply

adding an 80186-based board. There's no longer a need for these users to give up what they have already been working with for years. They simply add to their systems capabilities. This ability to upgrade systems as technology advances will always remain a key factor in our design efforts. Businesses shouldn't have to worry about what becomes of their computer every time a new processor is released.

With prices starting at \$4495.00 retail, the Poly 8/16 includes the Z-80 Master card and 80186 Slave card with RAM and software as described above on a 5 slot S-100 motherboard, one half-height 5 1/4" floppy with 800K storage, four RS-232C/RS-422 serial ports, two parallel ports, an adjustable serial terminal with 14" monochrome display and detached low profile keyboard. The Poly 8/16 comes complete in a small desktop chassis measuring 16"W x 17"D x 5 1/2"H (not including terminal).

terminal features high resolution color graphics including 960 x 480 resolution with 3 planes, 80 or 132 characters x 25 lines, 16 color display from a pallet of 4096 colors, emulates Tektronix 4010, 4014 and DEC VT 100 terminals, plus PLOT-10 software. The PMS-200 terminal may be added to each user station at any time. Also to be made available in the 2nd quarter of 1984 are units supporting 8- and 16-users and a series of networking options.

The Poly 8/16, with its' S-100 bus and Master-Slave technology, is designed to be the answer to a growing businesses need for multi-user computing power at an affordable price. Users are added to the system through the addition of 80186 based single board computers. By using this method, PolyMorphic Systems has solved the problem of rapid loss of systems performance which most conventional multi-user microcomputers suffer as more users are placed on the system. Also, unlike other so-called 16 bit systems, with the Poly 8/16, users get true 16 bit performance with the 80186, an important factor in today's advanced business applications. This gives the Poly 8/16 an economical growth path where users and computers power may be added to the system incrementally, and only as needed. In addition, with each user added, the cost-per-user of the total system decreases due to the fact that users share data files and expensive peripherals.

PolyMorphic Systems was formed in 1975 and was one of the pioneers of the microcomputer industry.

For additional information write or call Ken Gudis, PolyMorphic Systems, 5330 Debbie Lane, Santa Barbara, CA 93111 or call (805)967-0468.

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Options for the Poly 8/16 include a second 800K byte 5 1/4" floppy, half-height or full-height fixed or removable Winchester disk drives in capacities including 5MB, 10MB, 18MB, 40MB, and 80MB (Streaming tape drives will be available in the 3rd quarter of 1984). A wide range of printers, plotters, and internal modems are available which can be tailored to the users needs. The Poly 8/16 supports up to 4 users running 80186 Slave cards with each additional 80186 card containing 256K of user RAM standard and adding two serial and one parallel port to the system. Each 80186 card can be configured with either a standard serial terminal or with PolyMorphic Systems' PMS-200 graphics terminal for use in advanced business graphics or engineering and CAD/CAM applications. This

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ROBOTICS

Personal Robots As Educational Tools

by Bill Dodd

Even with the Personal Robot market becoming established and interest in home and educational robot units rapidly building, there are still many waiting to verify the value and utility of a personal robot prior to buying one. As in the development of the computer, utility is again the key to sales and ultimate maturity of the market.

As a change in pace over previous technical articles it is my goal to present a few very good reasons why a robot purchase now (or a robot building project now) is an excellent idea.

For those of you who purchased your first computer in the mid to late 70s, you probably remember the questions and stares you got from friends. The best question, "What does it do?" was the most penetrating, and usually evoked a half dozen weak answers. At that time, besides balancing the check book, the computer software available was so sparse that you spent most of your computer time writing programs, not using them. Not so today, as a computer system with disk and printer becomes a veritable workhorse.

Though we did not receive the full use of the computer at first, with the addition of peripheral equipment and more capable software, those early computers did become very useful! Their biggest impact was in what they taught us about computers. Likewise,

with the Personal Robot we are in the 'early days' that will be later remembered with nostalgia. At the current stage of Personal Robot development we see cleverly designed robots whose capabilities lend themselves more to the education, hobby, and experimental

fields. The true 'workhorse' type home robot does not yet exist, primarily because the necessary software is not available. What is available now; however is certainly very useful and most importantly can ultimately evolve into the workhorse we are looking for!

Now let us look at just what some of the valid uses of the Personal Robot are, and why this new technical field is here to stay!

1. HOBBY:

Perhaps the earliest use of the Personal Robot was as an experimental device by the en-

Continued on page 160

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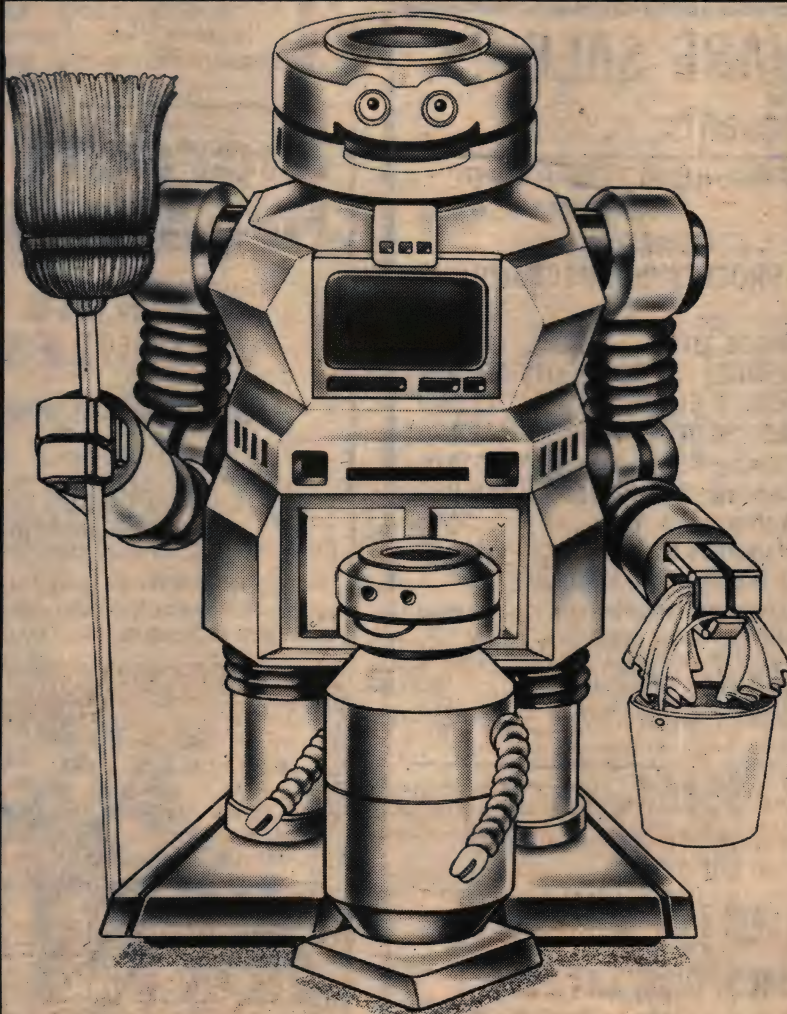
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Personal Robots

Continued from page 159

thusiasm and hobbyist. Robot building by hobbyists has been an activity for decades and the results cover a broad spectrum of uses and capabilities. The hobbyist doesn't have to have a practical reason for the activity; however, his involvement is usually related to a self educational program as well as

simply inventing something new. By doing it himself, the hobbyist gains an insight into robotics that a non-builder will miss.

A hobbyist will buy a personal robot either built or in kit form in order to forego some of the design requirements and parts shopping. He usually has plans to upgrade what he purchases with additional sensors and software.

2. RESEARCH: (general)

Some steps up from the

everyday experimenter, the organized researcher who purchases a personal robot is usually looking for a mobile platform to house some type of experiment. This can range through all types of robotics categories of power systems, manipulators, controllers, computers, sensors, and AI devices as well as non-robotics or special purpose devices. The personal robot provides a low cost solution to building a platform in-house!

3. EDUCATIONAL:

Perhaps the biggest current market for personal robots is in the educational field. This is natural, since many educational institutions as well as in-

structors recognize the future impact of mobile robots, and the need of competent designers and service people to work with them.

There are educational benefits in other areas also. The principles of process control and machine control can be demonstrated using a personal robot, and the subject of computer programming comes alive when the object of its program interfaces physically with the real world. We have just seen the start of educational use in schools, universities, and computer camps, and we can expect this to grow significantly!

4. SERVICE ROBOT DESIGN:

Perhaps the most interesting use of the personal robot is in service robot design. The personal robots currently on the

market all represent slightly different methods of control, power supply, and types of programming. By testing and evaluating these various systems, the designer can realize pitfalls and avoid them in his new design.

5. FUN:

Last but certainly not to be disregarded is the category of fun. The personal robot is certainly purchased for its entertainment value as well as for reasons under the above categories. Though entertainment value is now limited, as the P.R.s become more capable, the entertainment value and capabilities will certainly come to play a great part in its selection.

There we have a small but significant list of reasons why the purchase of a personal robot now is a valid decision. As in the case of the computer, we will not see all of the advantages instantaneously; but over a period of time, as we become more capable in using and upgrading the robot! •

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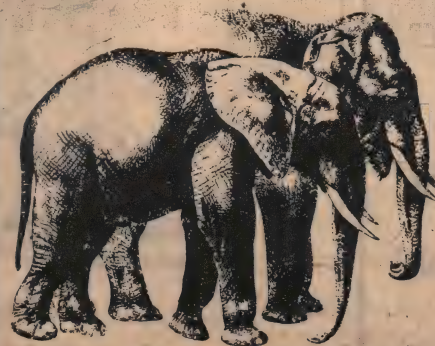
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The First International Personal Robot Congress And Exposition

by Kent Myers

The International Personal Robot Congress and Exposition was held in Albuquerque in mid-April. Beforehand, a national artist's competition was held, and the winning entry was a fitting symbol for the exposition. Georgia O'Keeffe made famous the bleached skull and horns of a steer, and the winner here pictured the spindly arms of a robot posed in the same way. Both pictures found beauty in objects that we don't normally see in that way, and both discoveries were made in the strong sun of New Mexico.

The exposition included about 25 commercial displays, smaller displays for homebrew equipment, an art exhibit, and plenary sessions with speakers such as Isaac Asimov (via satellite) and Joseph Engleberger of Unimation fame. About 300 people attended technical sessions for two mornings and 2,500 people inspected the exhibits. Even though the exposition was small, it was densely packed with robot developers and their latest equipment. There were several rolling, talking production robots, principally those from RB Robot, Androbot, and Heath. There were some

sophisticated software packages, such as those from Virtual Devices and Excalibur Technologies. There were even multiple magazines, newsletters, and book sellers dedicated to the field. The personal robot world has achieved an identity distinct from both the microcomputer world and the industrial robot world, and there was no question in anyone's mind, after seeing so many capable and energetic people converging on similar goals, that the industry will flourish eventually. It was estimated that 10,000 units were sold in 1983 for \$20 million, and that sales are pick-

ing up.

To the exasperation of developers, the attendees constantly asked, "What do they do?" People new to the field often have unrealistic expectations, inspired in some cases by the movies. Current robot

owners are content with learning how they work and putting together subroutines. Just getting a robot to move among rooms is no small feat.

Continued on page 162

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USE ELECTRONICS

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Many feel that the use question will be answered in ways we cannot predict at this stage, and for now it makes sense to push ahead to build machines with general capability. From this starting point, there are two issues. One is software. Many have concentrated on the formidable task of producing the hardware, and have left software hanging. Some

very simple demo programs were thrown together for the conference. Few programming tools of any kind are available, let alone applications.

Some companies have tried to move ahead on all fronts and stumbled. Nolan Bushnell joked that he had underestimated the task of building a robot by \$4.5 million. The larger companies seriously encouraged third party suppliers at this meeting: they have learned that the job is immense and that they need the laboratory represented by independent software developers and

tinkerers.

The other issue is cost. To achieve an interesting combination of hardware, a buyer can spend over \$4,000 for Androbot's BOB, over \$2,000 for RB, and less for Heath's HERO in kit form. Prices may not fall quickly because the products are hardware intensive and use low-volume parts. On the other hand, many thought that a robot's price could be much higher, if it were useful. The 'father of robotics', Joseph Engleberger, mused in private conversation that if he were going into the household robot business he would raise \$50

million, do nothing but development for 3 years, then sell his robots for \$90,000 as adjuncts to new luxury houses. At the other end, Analog Microsystems (Boulder, CO) has hooked up a toy arm (Armatron) to a tiny computer and is having some success. They have added inexpensive but interesting experimental gadgets, such as the MicronEye video camera.

Despite paltry sales overall and huge development tasks, participants were hopeful about the personal robot industry. In fact, some experts soberly predicted that home

robots will eventually outpace home computers. Local organizers said that they have seen such intensity among conference goers, and never so much media attention.

RB Robot

RB Robot (Golden, CO) had a popular display. Children could push the RB5X bumpers and play games as the robot said witty things. Adults checked out the sensors and equipment and realized that, while the framework was attractive, there were upgrades and add-ons to consider. The add-on arm is half as fast and twice as strong as HERO's. The

Continued on page 163

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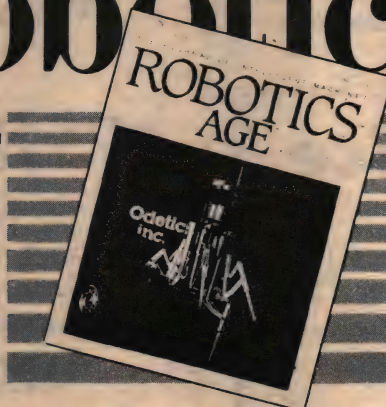
We've read about robots for decades in the science fiction genre. Today's creative engineers are fast making yesterday's fiction obsolete. The technology is becoming real... Real engineering of real-time computer systems for real applications—that's what robotics is all about. **Robotics Age** is your monthly window on the nuts, bolts, bits and design concepts of this new microprocessor hardware and software technology. The inspiration of science fiction plus the practical information in **Robotics Age** keep you abreast of this exciting field.

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In past issues, we've had several articles on walking robots—the design problems of legged mobility. One article described aspects of a one-legged hopping robot. Another described ODEX I, a recently designed experimental six-legged mobile robot. ODEX I has been widely publicized, including an appearance on a syndicated television series as well as



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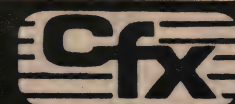
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vacuum cleaner option isn't ready yet. Most doubt whether RB will be able to sweep effectively, but representatives from Electrolux from Sweden were listening carefully. Another option, Saavy from Excalibur Technologies (Albuquerque, NM), is a clever software environment which can serve as a database manager, but when applied to robotics offers flexibility in writing motion subroutines and integrating speech, but also helps in writing programs that learn.

Few robots are equipped for general navigation. Bob Francis of National Robotic Systems (Marblehead, MA) is off to a good start with RB. He poked a hole through RB5X's plastic dome and inserted a rotating Polaroid ultrasonic rangefinder. The device quickly samples pie-sections and can display its readings graphically on a monitor. RB Robots itself has a number of more minor computer upgrades, but still little software. A retailer explained how he desperately needed RB demo software. This software is almost ready, but the customer won't be getting it to take home or modify. Nevertheless, the RB5X is a

good product for those who want to take advantage of its open design and create their own software.

This market limitation has been a problem for RB. Joe Bosworth, RB's president, explained that they set up a wide retailing network, then discovered that the average home owner would not be able to handle the machine, and have since cut back to those retailers who can provide significant technical support to hobbyists and technically adept educators who are willing to take the plunge. In an ironic reversal of the situation in industrial robotics, RB will be selling its robot in Japan.

Androbot

Nolan Bushnell of Androbot (San Jose, CA) coined some memorable slogans such as "fun sells" and "slavery without guilt." His group showed BOB and Topo, but not the simpler models.

After many redesigns, BOB may be ready this summer. It is IBM compatible--a dubious distinction for a robot. In contrast to the Topo, the electronics are well along, but the body consists of a surplus Topo head stuck atop a squarish black body. It has two upright drive wheels and two following casters, unlike Topo's radical design of canted wheels and swaying body. It has a fork-lift

manipulator, which doesn't seem as exciting as an arm, but it has greater practical potential by offering high power at a low cost. The fork lift needs to have its load (the venerable six-pack) palletized on a special pedestal table that it can recognize.

BOB had a "Follow-Me" program which could lock on to a person, keep within a respectful distance, and say "I found you" after you have moved and stopped. You can program from a personal computer, use an adaptation of the Forth Language and the many speech facilities, and send commands over the infrared transmitter. The infrared technology has some problems. New Topo owners want to play with their robot outside. But sunlight means 'go' to Topo, and more than a few have wandered into the pool.

There was no evidence of third-party support, but that may be because Topo is a closed machine (you have to break rivets to get inside), while the more flexible BOB has only just arrived. Androbot has prepared an information package for software developers.

Heath

Heath (Benton Harbor, MI) has no trouble answering the use question. They designed HERO for education, and even

resist classifying it as a personal robot. Heath had 70 to 90 percent of the personal robot market in 1983. They are now, in terms of units, the largest supplier of robots in the world. Heath showed a new radio-operated teaching pendant, and this was the means they had to make the robot look cute, shake hands, and so forth. The machine is not nearly as cute when under programmed control. The machine is difficult for a user to program and this might explain the lack of demo software. Ignoring all the hassles, its base software is considered quite good.

Since HERO is an open design, third-party suppliers have rushed in to fill a gap. Micromation and Interface Technology (Columbia, MD) have added a serial port, programming tools, extra memory, and -- unique in this exhibit -- a voice recognition facility. Virtual Devices (Bethesda, MD) is the first to answer the needs of the program developer, which is really anybody who buys a robot these days. In one of the technical sessions a speaker sought to classify existing software products, but this one baffled him because it seemed to fit everywhere and nowhere. What they did was let the human operator use the

machine he is best suited to, the personal computer. He has available to him, all on the same screen, a program editor that prompts and checks syntax, a quick way to simulate execution, various downloading facilities, means to get status reports and uploads from the robot, and in various other ways control program execution, record positions, etc. But the robot isn't just a dumb recipient. It uses the personal computer also by calling back to read new programming from the disk drives. To do this they installed a high-power replacement computer aboard HERO and have the two computers communicate, without errors, over a duplex digital radio. On top of that they offer an optional C compiler adapted to HERO. That's a world of difference from Heath's teaching pendant.

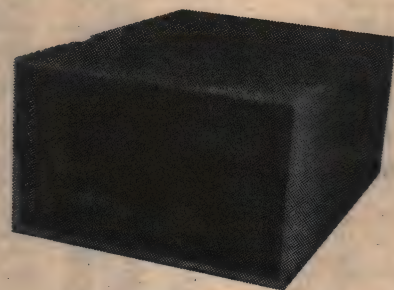
Other News

Other commercial robot designers attended but did not exhibit. The Scarab Robot (San Francisco, CA) is dedicated to bartending and will mix drinks on voice command. The expensive GENUS domestic robot is not ready. Others said that they had superior technology on the way, but it's hard to

Continued on page 167

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74LS193	.78	74LS367	.44
74LS194	.68	74LS368	.44
74LS195	.68	74LS373	1.35
74LS196	.78	74LS374	1.35
74LS197	.78	74LS377	1.35
74LS221	.88	74LS378	1.13
74LS240	.94	74LS379	1.30
74LS241	.98	74LS385	1.85
74LS242	.98	74LS386	.44
74LS243	.98	74LS390	1.15
74LS244	1.25	74LS393	1.15
74LS245	1.4	74LS395	1.15
74LS247	.74	74LS399	1.45
74LS248	.98	74LS424	2.90
74LS249	.98	74LS447	.36
74LS251	.58	74LS490	1.90
74LS253	.58	74LS624	3.95
74LS257	.58	74LS640	2.15
74LS258	.58	74LS645	2.15
74LS259	2.70	74LS668	1.65
74LS260	.58	74LS669	1.85
74LS266	.54	74LS670	1.45
74LS273	1.45	74LS674	9.60
74LS275	3.30	74LS682	3.15
74LS279	.48	74LS683	3.15
74LS280	1.95	74LS684	3.15
74LS283	.68	74LS685	3.15
74LS290	.88	74LS688	2.35
74LS293	.88	74LS689	3.15
74LS295	.98	74LS783	23.95
74LS298	.88	81LS95	1.45
74LS299	1.70	81LS96	1.45
74LS323	3.45	81LS97	1.45
74LS324	1.70	81LS98	1.45
74LS352	1.25	25LS2521	2.75
74LS353	1.25	25LS2569	4.20

6500

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6504	6.90
6505	8.90
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6522	6.80
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6551	10.85

2 MHZ

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6545A	26.95
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Z80A-DART	9.95
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Z80A-PIO	4.29
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Z80A-SIO/1	12.95
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7824T	.74	7905K	1.44
7805K	1.34	7912K	1.44
7812K	1.34	7915K	1.44
7815K	1.34	7924K	1.44
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2.0	2.69
2.097152	2.69
2.4576	2.69
3.2768	2.69
3.579535	2.69
4.0	2.69
5.0	2.69
5.0688	2.69
5.185	2.69
5.7143	2.69
6.0	2.69
6.144	2.69
6.5536	2.69
8.0	2.69
10.0	2.69
10.738635	2.69
14.31818	2.69
15.0	2.69
16.0	2.69
17.430	2.69
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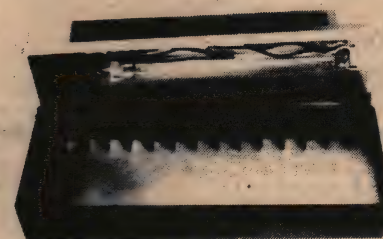
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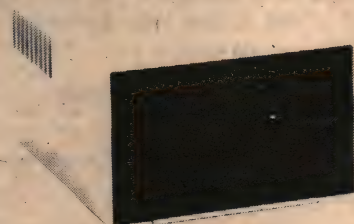
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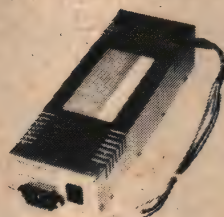
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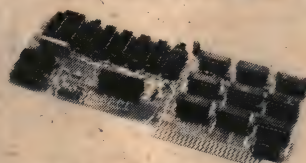
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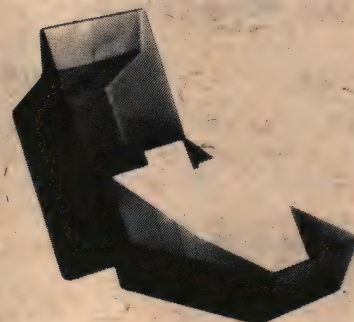
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believe these statements, judging from the failures and false starts that each exhibitor recounted.

The people from Rhino, who make arms and the Scorpion carriage, were saving their exhibit for a later conference oriented to industry. It was surprising that arms weren't more prevalent, but there's a growing consensus that arms are dull. In a meeting on education there were cheers for the claim that models of assembly arms were limiting, and that the problems and concepts of control are better explored when using sensors and mobility rather than just arm motion. Also, there really are very few jobs for robot arm technicians, and it's a mistake to lead young people down that path.

Homebrew

There were some delightful and odd designs among the homebrew exhibits. One device that didn't win a prize was a roving fire extinguisher

that hosed down the shoe of one of the judges. The two following designs won Golden Droid awards.

William La's Fetal II demonstrated a new design in locomotion. The body of the robot can move in any direction without first having to turn in place to orient its wheels. There are three wheels, all with varying motor speed, all aimed in different directions! The trick is that the wheel treads are small rollers that allow the wheel to slip sideways as the body moves. The robot can move with great accuracy by calculating how much thrust each wheel is contributing and then adjusting the motor speed accordingly. This design is used in a wheel chair that lets a person maneuver efficiently in tight spaces.

One of the imagined uses for robots has been accomplished -- mowing the lawn. A standard gasoline mower darted around the exhibit hall by turning all four wheels in synchrony. A cutting pattern can be remembered and repeated. The program can be overridden with radio commands, and

the device will sense bodies approaching, warn them with speech, and if necessary turn itself off. Nels Winkless, a conference organizer from New Mexico, figured this machine "could lay waste a field of sorghum in no time."

Looking Ahead

In one of the technical sessions Jonathan Oakey, who has been deaf since birth, suggested that deaf people have special abilities as robotic programmers. They have worked a lifetime figuring how to get the most use from their senses, and could transfer this ingenu-

ity to programming "sensorially" handicapped devices." Oakey also explained that the deaf don't depend so heavily on words but think more pictorially and concretely -- in other words have a "different operating system" that might help in the development of radical robot designs.

Even though personal robots don't do much, they are lovable, and this quality might keep the market alive in the short run. One builder added fur to his turtle-type robot, and this small change helped cast the robot in the role of pet.

Even factory workers, we were told, have sent get well cards to broken shop-floor arms. Fred D'Ignazio and Nolan Bushnell exchanged stories about how Topo has become a member of the family. But Bushnell has to keep bringing home new software or the kids get bored and shut Topo in the closet. In a session where developers offered predictions, they agreed with Joe Bosworth's conclusion that the personal robot business is extremely volatile, and that today's predictions will seem naive in only one year. ●



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Robot Ping-Pong Competition

The Steering Committee of the International Personal Robot Congress and Exposition (IPRC) has accepted a challenge from the British, for American roboticists to participate in a unique robot competition slated for 1986.

The Robot Ping-Pong Contest, conceived by Dr. John Billingsley of Portsmouth (England) Polytechnic, will pit computerized personal robots against each other at specially designed ping-pong tables. Contest organizers believe that

the sensor technology enabling robots to "see" the ball and to then successfully return it to their opponents will become available in the next two years. They also expect most of the robot "competitors" to be built by enterprising individuals rather than by large manufacturers.

The IPRC, which was scheduled for April 13-15, 1984, in Albuquerque, New Mexico, marked the first time personal robot enthusiasts from around the world gathered to

display their creations, exchanged information, and view the latest in robotic technology. The Steering Committee expected attendees to the 1984 Congress to take up the challenge of the ping-pong competition.

IPRC '85 scheduled for Albuquerque in March 1985, will include the first U.S. trials for the Robot Ping-Pong Contest to begin selection of the American team that will compete in England in 1986.

According to Joseph H. Bosworth, chair of the IPRC Steering Committee and president of RB Robot Corporation, "This contest and similar activities expected to take place in the next two years are certain to spur further important developments in robotic technology. We also see the IPRC generating interest in the development of robots that serve people in the home and health services field as well as in industry."

Robot Ping-Pong Game Description

The first contest will be held in 1986, by which time many more one-armed robots will be in the hands of enthusiasts, many of whom will have built their own from scratch.

To avoid danger to health and safety at play, the table is a mere 50 cm. wide, and a frame at each end further limits the playing space to 50

cm. in height. The net in the middle of the two-meter long table is 25 cm. high.

Above the net is yet another 50 cm. square frame to outlaw the unsportsmanlike practice of lobbing the ball out of view of the opponents sensors. The bat size must not exceed a circle of diameter 12.5 cm. and the bat must not encroach inside the playing frame at the end of the table.

A simple mechanism near the top of the center frame serves that ball towards the serving robot. It must return the ball so that it bounces once on the opponent's end of the table before emerging from the opponent's playing frame. The robot opponent must in turn return the ball to bounce just once on the opposite end of the playing table and the game proceeds. If the ball strikes the playing frame, the point is lost. It is possible that there may be some very long rallies, so if the opponent successfully returns the ball 20 times, it wins the point.

The surface of the table will be three-quarters of a meter above floor level and each robot will have a 1 m. square of floor on which to stand. The means of illumination will be agreed with contestants as the contest draws nearer, but will probably be by tungsten filament lamps well out of the field of view of each robot.

Robot vision is at present a costly commodity. Many of the techniques currently under development require massive computer power to analyze the optical image. The contest will, it is hoped, encourage the development of low-cost sensor techniques capable of tracking the ball, perhaps no more than half-a-dozen simple photocells behind a cheap camera lens.

Restrictions must be applied to the moving mass and power of the robot for safety reasons.

At this early stage, it is hard to set a limit: a Puma 600 is clearly over the top, while an Armadroid lacks the reach and speed. We will, no doubt, see some ingenious home-grown robots, perhaps with a structure of glass-fiber reinforced foam. Car window-winder motors could be in great demand.

The fastest net-skimming return from a low ball takes just under 0.5 seconds from bat to bounce, and has a vertical velocity on bouncing of just over two meters per second. It should be almost within the performance of the servos of any self-respecting high-speed plotter. On the other hand, a lob will give more time to respond but may have double the vertical velocity.

Contestants should avoid some of the more obvious preconceptions. The bat need not look very much like a bat provided that it does not exceed the size limitation. A curved surface could enable accuracy of control to be traded for the need for bat angle actuators -- a corner reflector must be ruled out because of treble hitting. The robot need only rely on arm movement to strike the ball, a spring-loaded bat could be triggered to give an impact, which suggests accurate range finding and precise timing.

The problem of vision is reduced by allowing both robots to lock on to the ball before it is served. The net is transparent and so the problem is one of tracking not of acquisition. A robot that cannot keep its eye on the ball will deserve to lose the point. Those parts of the robot seen by its opponent must be dark in color to provide a good contrast -- it may be necessary to specify a black paint that is also black to infrared light. The back of each robot should, in contrast, be flamboyant and entertaining.

For further information on the IPRC or the Robot Ping-Pong Contest, contact Sharon D. Smith, IPRC, 777 Locust Street, Denver, CO 80220, or call (303)278-0662. For more detailed information on the competition itself, contact Dr. John Billingsley, Department of Electrical and Electronic Engineering, Portsmouth Polytechnic, Anglesea Road, Portsmouth, England PO1 3DJ.

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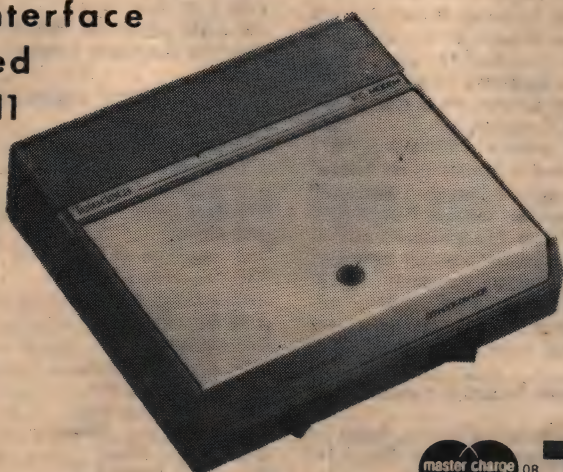
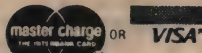
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- Extensive customer information file
- Flags Credit limits and overdue balances
- Invoices from sales orders support backordering system
- Invoices for point-of-sale
- Multiple Price discounts and Sales tax rates
- Sales orders with packing slips
- Supports partial payments, finance charges, aged balances, and statements
- Supports special sales packages (bill-of-material)
- Supplies telephone number and contact name for overdue accounts
- Detailed transaction Audit trail
- Customer Activity Report
- Open Item Balance Forward
- Calculates Sales Commissions for payroll module
- Allows Sales of assets
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General Ledger

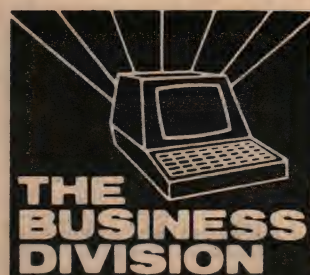
- Chart of accounts
- Itemized monthly Journal transactions
- Asset depreciation, Complete G/L Reports, Daily Journal, Trial Balance, Operating Statement and Balance Sheet
- Supports up to 9 separate Profit Centers

Inventory Control

- Provides ON LINE information to all other modules
- Purchase orders with review or automatic ordering mode
- Complete backordering system included
- 25 items per bill-of-material
- 1500 stock items per 320K diskette with automatic advancement to next diskette
- Complete Vendor information file
- Calculates reorder quantities and displays lead times
- Physical inventory using average cost method adjustments
- Reports in inventory module include: Complete Inventory Report, Sales Analysis, Reorder Report, Purchase Order listing, Sales Package listing, Summary, and Labels



Maxi Accountant is designed for MS-DOS systems, including IBM PC and XT, Zenith Z-100, Victor 9000, Texas Instruments PC, Columbia, Compaq, Hyperion, Corona, Eagle PC, and Rainbow 100.



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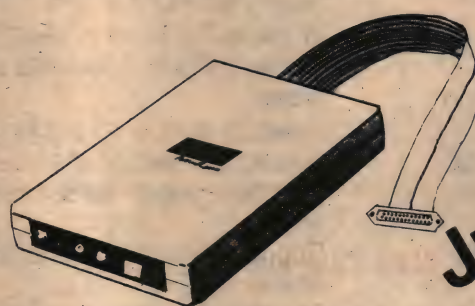
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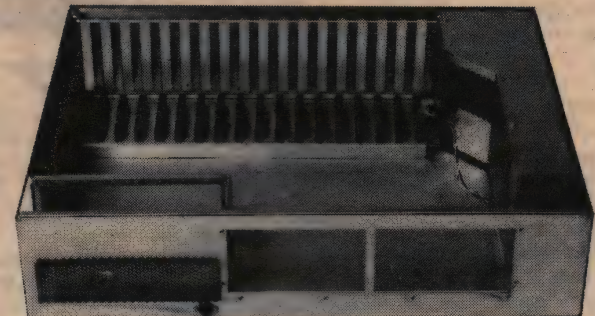
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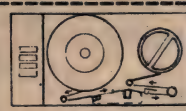
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Computer Shopper's deadline for display and classified ads is the 2nd Monday of the month.

(125B) SINCLAIR SOFTWARE, PERIPHERAL

TIMEX SINCLAIR and Radio Shack/sharp pocket computer books, programs. Send SASE for list. **Zwillenberg**, 21 Tekening, Trenton, NJ 08690. 6-54

SURVEYING 8 part program in BASIC on cassette. Does most survey computations. TI 99/4A and Sinclair w/16K RAM \$15.95. Description \$f. **P.G. Billings, Jr.**, Dept. CS, 12134 Bonnie Terr., Seminole, FL 33542. 5-54

WORD PROCESSING W/T/S 1000, 1500, 2068; port program for 40, 80 and 132 character printers. Info, catalog and free gift: **BSASE to SAF Users' Group**, P.O. Box 313, Mason, MI 48854. 7-56

FREE CATALOG Timex Sinclair 1000, 1500, 2068 software and hardware. **Curry Computer**, 5344 West Banff, Glendale, AZ 85306. 602-978-2902. 7-56

T-S HORIZONS

Monthly magazine for TS1000, 2068 users. Programs, projects, tutorials, reviews, more. Nationally known writers. 32 pages. \$12 year. \$1.25 sample. **TSH, 2002-N Summit**, Portsmouth, Ohio 45662.

(126) MISCELLANEOUS MICROCOMPUTERS

SANYO 550 PC, IBM Compatible, 128K, 1 disk dr, WORDSTAR, CALSTAR, 12 inch amber mon. ALSO, 4 blank diskettes, and disk file. **ONLY \$1099**. Call: 203-255-3170. **Ray Laracuenta**, 386 Sigwin Dr., Fairfield, CT 06430. 6-54

CORONA PC2 dual drive, MS-DOS, monitor, software, mint, in boxes, purchased for project but never used, \$2400 FC, 214-223-1006 - leave message on machine please. **Anthony J. Shimps**, P.O. Box 839, Duncanville, TX 75116. 6-54

ATTENTION OSBORNE OWNERS! ON (Osborne Newsletter) is clearing overstock of back issues. Regularly \$1.50 ea., Now \$.75 or the entire 2 year set (filled with tips, etc.) only \$15 (a \$36 value). Send check or M.O. to **O.N.**, POB 21016, San Bernardino, CA 92406.

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Percsi 299B Disk Drives - Excellent condition, 2 ea. only in stock\$450 ea. + Shipping

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Disk Drive Cases with Power Supply for 2-5 1/4" half height Disk Drives\$55

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Motorola Monitors - 12" model 3003-140 22MHZ bandwidth. P4 phosphor. 115VAC w/manual. New in factory sealed cartons\$65 + UPS

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(127) XEROX COMPUTERS FOR SALE

XEROX SIGMA 7 & 9 reference manual set - \$25. C. Pastore, P.O. Box 701, Nesconset, New York 11767. 516-435-0222 (days). 7-55
Computer Shopper's deadline is the 2nd Monday of the month.

(127A) XEROX COMPUTERS WANTED

CASH PAID
for Xerox and other micros. Used Computer Exchange, 202-337-1303.

(127B) XEROX SOFTWARE, PERIPHERAL

dbase II plus JRT Pascal in Xerox 820. \$350 for both. All documents included. J. Reuwer, 4720 Amberwood, Dayton, Ohio 45424. 6-54

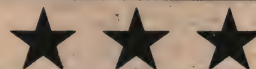
MICROSOFT BASIC-80 for Xerox 820, never used, \$250. 804-420-2031.4-54

SOFTWARE BARGAINS: MicroSoft Basic-80...\$100. Wordstar...\$135, Datastar...\$75, SuperSort...\$75, SuperCalc...\$75, Condor 20-1(8")...\$50. Ltd. Qty. Unused, w. lic. LEN, 212-777-4353.

(128) MISC. MICRO. SOFTWARE, PERIPH.

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(129) S-100 COMPUTERS

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IMSAI WANTED: Original metal
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21-slot motherboard, 30 amp power
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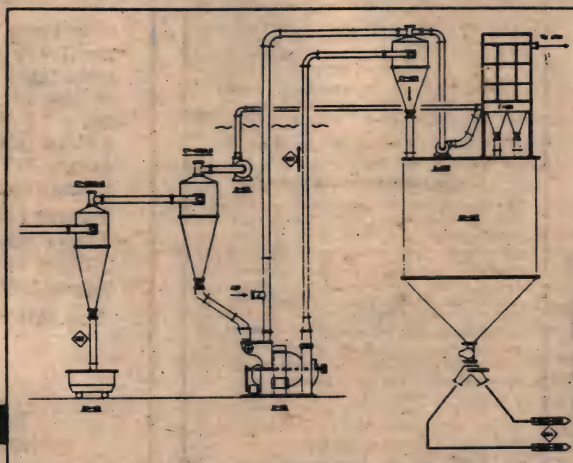
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S100 COMPUTER Compuprism high-density graphic board, \$25. Imsai CPU board \$25. Jade DD disc-controller board with manuals, \$150 or best offer. 2708 - \$.50 @. 2716 - \$.2 @. 2732A - \$.2 @. **Richie**, 813-897-3047.

S100 BOARDS - Godbout memory 2-8K \$45/ea. 1-16K \$75. Processor Technology VDM video board \$125. All like new with manuals. **Mike Roberts**, 3766 Andrew Ave., Cincinnati, Ohio 45209. 513-531-2021.

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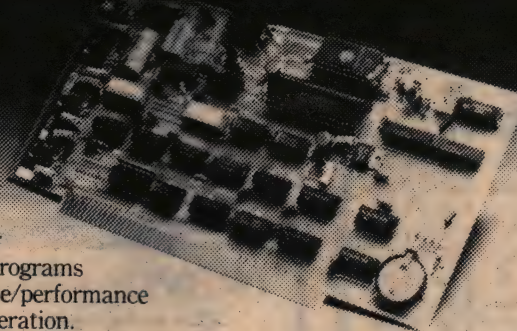
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Apple DMP 1/2x14 yds.	5.50	5.20	4.90
Centronics 700 Zip Pack, 9/16x15 yds	3.50	3.30	3.10
Commodore Pet, 1/2x20 yds	6.25	5.85	5.50
C. Itoh Prowriter 1/2x14 yds	5.50	5.20	4.90
Diablo Hytype II Multistrike, 5/16x135 yds	4.50	4.20	3.90
Diablo Hytype II Nylon, 5/16x21 yds	4.55	4.25	3.95
Digital LA 30/36 1/2x36 yds	4.80	4.50	4.20
Epson MX70/MX80 2x20 yds	5.00	4.75	4.50
Epson MX100 1/2x30 yds	9.95	9.30	8.75
Epson MX100 Refill pack 1/2x30 yds	6.25	5.85	5.50
IDS Microprism 1/4x12 yds	5.60	5.25	4.90
Juki 6100	2.50	2.30	2.00
NEC Spinwriter 5500/7700 M/Strike 1/4x133 yds	4.95	4.65	4.35
NEC Spinwriter 5500/7700 Nylon 1/2x15 yds	5.00	4.75	4.50
Okidata - 80, 82, 83 1/2x18 yds	2.40	2.20	2.00
Okidata 84 1/2x40 yds	4.75	4.50	4.20
Qume Nylon 1/4x15 yds	4.00	3.80	3.60
Qume Multistrike 1/4x98 yds	3.90	3.70	3.50
Radio Shack LPVI-VIII 1/2x12 yds	5.60	5.25	4.90
Teletype 43 1/4x13 yds	7.40	7.00	6.50
Texas Instruments 810 1/2x40 yds	4.10	3.85	3.60
Wang Multistrike 2281/5581/6581 5/16x180 yds	4.85	4.50	4.25
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64K DRAM BOARD, configured for
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- \$140. ADM3A Terminal w/10 key
pad - \$395. BDS C ver 1.4 - \$75.
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4.64 - \$200. JRT Pascal ver 3.0 - \$20.
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(130) S-100 COMPATIBLE PERIPHERAL

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SAI SIO - \$50. NS sgl-dens disk con-
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6-54

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terface. • Micro Systems Design.
MFIO-1 board. • SD Sales Z8800
CPU card • SWTPC 6800 System
Notebook. \$15 each or all for \$75.
C. Pastore, PO Box 701, Nesconset,
New York 11767. 516-435-0222
(days). 7-55

\$100 BOARDS - Econoram II 8k
static \$60, 2 each Econoram VIIA
24K static (populated 16K) \$85
each. Dynabyte 16K dynamic \$75.
IMSAI MIO w/cables \$80. SD
Systems VDB8024 \$175. PMMI
MM103 Modem board comp \$200.
MSI 8K prom board w/11 proms \$80.
Digital Systems FDC1 controller
board w/HB1.3 interface board and
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605-692-4411. 6-54

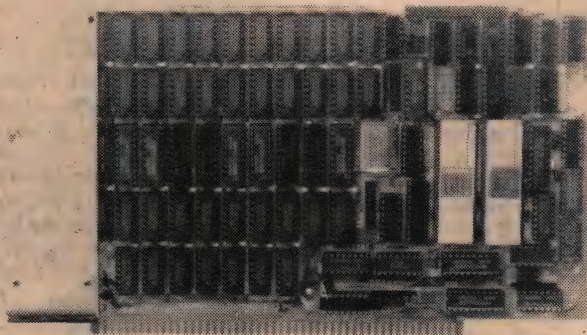
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age memory color graphics TV
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(131) S-50 COMPATIBLE PERIPHERAL

5 MEGABYTE Hard Disk Add-on for 6809/Flex - from \$700, with software and interface. Digital Search, 803-877-9444.



PROTECT YOUR Personal Computer! Avoid dust contamination that could damage your computer! We have the answer—a high quality low cost computer cover with a non-scratch inner surface. Available for Commodore 64, 20, Atari 800XL, TI/994R. Send \$6.99 ea. plus \$1 shipping. Burg, Associates, 5624 N. Beech Daly, Dearborn, Michigan 48127. 6-54

Computer Shopper's deadline is the 2nd Monday of the month.

(132) HEATH COMPUTERS FOR SALE

H-89A 64K DSDD grnscrn CPM with H-37's 1.2MB DSDD drive system, dust covers, Excellent condition. MBasic Supercalc, many discs. Sacrifice at \$1800!! 304-242-9204 evenings. 5-54

H-8 with H-19A terminal, Trionyx 64K memory, H-8 Z-80 CPU, also 8080 CPU, H-8 3 port parallel board, H-8 4 port serial board, H-8 5 board, H-17 disk controller, 3 disk drive system with 40 track Siemens floppy and two Tandon TM100-4 80 TRK 2 sided drives, ASR-33 TTY printer. Many CP/M and HDOS files. \$1500. 201-531-0067. 7-55

SYSTEM GUIDE for Heath H11A/H27 - includes MSC 4601 memory, Memorex FD (WH-27), & H11-5 serial module. All for \$25. C. Pastore, PO Box 701, Nesconset, New York 11767. 516-435-0222 (days). 7-55

HEATH H8 and H9 terminal 48K RAM cassette, disc controller, all documents, \$200. Ron Freiberger, 317-457-6972 after 6pm.

H89 COMPUTER 64K, two 5.25" disk drives, magnolia double density disk controller, Cleveland Codonics high resolution graphics board, three serial ports, H14 printer, much software, \$2250 negotiable. Jeff Janover, 30 Ada Dr., S.I., NY 10314. 212-761-9680.

HEATHKIT ET3400/EE3401 Micro-processor trainer & course. Factory perfect. No marks in manuals. \$175 + ship. 614-922-1718, 11-5.

(132-A) HEATH, SOFTWARE, PERIPHERALS

5 MEGABYTE add-on Hard Disk Sub-system for Heath-89. Kit - \$800. Digital Search, 803-877-9444.

RAMDRIVE/85 for CP/M-85 on H/Z-100 series computers use extra ram as a fast ramdrive. Requires at least 192K of ram. Once integrated with bios installs automatically. \$39.95 + \$1 shipping. ZCOPY.COM copies ZDOS files to CP/M, \$24.95 + \$1 shipping. J.J. Thompson, 281 Warren Ave., Kenmore, NY 14217. 7-56

USED SOFTWARE for Heath/Zenith Z-100 type computer. Condor File Management System \$75. Microsoft Z-Basic \$75. Z-Dos \$75. Multiplan \$75. Lotus 1-2-3 \$85. CP/M-85 \$85. Peachtree 5000 \$85. Fortran compiler \$85. Cobol-86 \$85. Wordstar \$85. Call Joe at 505-266-2344. 6-55

(133) BURROUGHS SYSTEMS

CONVERGENT TECHNOLOGIES AWS 200 work station. Option 265 with 386 KB RAM. 16 MB Winchester hard disk and 5 1/4 inch floppy drive. Mint condition. 6 months old. \$7500 firm. Telephone Modem: Universal Data Systems 201C. 0-1200 baud/2400 BPS. 2 wire or 4 wire (half or full duplex), auto answer operation. \$700 firm. Cash or certified check. Please call or write Mort McKenzie, P.O. Box 2811, Spring, Texas 77383. 713-353-3472. 7-56

(134) HEWLETT PACKARD COMPUTERS FOR SALE

HP9862A CALCULATOR PLOTTER Excellent condition, working, \$400 or best offer. 215-264-2800 ext. 364, days. Tom Paden, 1732-M Troxell Ct., Allentown, PA 18103. 6-54

HP85A \$975. HP83 \$450. 7225C \$600. Also ROMs and software at half price. Everything like new. 313-528-1571 or P.O. Box 1034, Troy, Michigan 48099. 6-54

CPU's 2100A w/64kb, DMA, flt. pt. \$450. 2108 w/64kb, mem. protect, DCPC \$650. 12984 Line Printer sub-system \$600. Misc. 2000 series cards. Call Ken, 201-584-7604 after 6pm EST. 7-55

HP-41C SYSTEM Calculator, printer, mag card - Mint, all manuals, boxes, etc. \$400 COD. Ben Schaub, 1116 Kalmia Ct., Crownsville, MD 21032.

MINT 2116. Owned by HP and meticulously maintained. TTY and paper tape interfaces. Removed from industrial use while still running fine, but no guarantee included. \$500, barter considered. Norm, 408-248-3298.

HP125, 82901M dual disc drives, 50 Dysan discs, lots of very good software, more, \$2500. 504-835-1798 or 505-982-0807.

41CV SYSTEM. 82143a Printer, Card Reader, Wand, all X-Memory and X-functions. Time, Stats, and PPC Modules. Lots of software. New April 1983. \$950 or trade for Radio Shack 100. Bill VanOrden, Route 2, Iowa City, Iowa 52240. 319-337-4950 anytime.

(134A) HEWLETT PACKARD COMPUTERS WANTED

WANTED: HP DISK DRIVE HP82901; HP82902; HP895A, \$250 for single drive. \$500 for the dual drive. C. Winfree, 28031 Lorraine, Warren, Michigan 48093. 313-574-5577, before 5. 313-573-4717 after 5.3-54

HP-86B WANTED with ROMS. C.M. Clay, 635 Gary Street, Augusta, Georgia 30904. Tel. 404-736-9062.

WANTED for HP-125: 8" drive, printer, software, plotter, etc. Thos. Magee, 22415 Clarksburg Road, Boyds, MD 20841.

WE BUY Hewlett Packard computers. Godfather's Used Computer Syndicate, 508 Hickorywood Ave., Altamonte, FL 32714. 305-774-1000. 7-55

(134B) HEWLETT PACKARD SOFTWARE, PERIPH.

HP-120/125 COMMUNICATIONS with auto-dial, file upload and download, VT-100 emulation, and remote mode supporting ASCII, Binary, and EBCDIC data. Precision Computer Systems, 308 Main Street, Havelock, NC 28532. 919-447-1301. 5-57

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SERIES 80 computer, I/O ROMs, etc. 502-683-9871. 5-57

(136) DATA GENERAL SYST.

DATA GENERAL Buy - Sell - Used equipment and peripherals. Contact office nearest you for your FREE brochure. Texas 214-780-1600; Illinois 217-351-7982; Nevada 702-739-5356. International Computer Remarketing, 3-57

(138) DATA GENERAL, SOFTWARE, PERIPH.

(142) DATAPOINT SYSTEMS

Computer Shopper's deadline for display and classified ads is the 2nd Monday of the month.

(144) DATAPOINT SOFTWARE, PERIPHERAL

(148) DEC SYSTEMS FOR SALE

DEC VT-180: VT-100 terminal with 64-k, 3 serial RS-232 ports and four 5 1/4 inch floppy drives (SSDD, 170-k each). Software includes CP/M, select word processor/ spelling dictionary, multiplan spreadsheet, and MBASIC. With covers for terminal and keyboard, all manuals. 303-599-5701 after 6pm or leave message at 303-594-4082. 7-55

DIGITAL H780 power supplies, mint in original cartons. Deliver + 5V/18A, + 12V/3.5A. Front panel switches with indicators and line time clock. Integral fans and line filter. Can be used on 110/220 volts. 5 1/2 x 3 1/4 x 14-5/8, 13 lb. \$75 plus shipping. Call Mark, 203-853-7856 or PO Box 179, S. Norwalk, CT 06854. 6-55

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Complete DEC RX02 compatible floppy disk systems with the new Micro Technology MXV22, 22 bit Q-bus controller:

(1) 8" SS/DD drive (Siemens FDD100-8) \$1500
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(2) 8" SS/DD slim line drives (Tandon 848-1) \$2250
(2) 8" DS/DD slim line drives (Tandon 848-2) \$2450

Floppy disk systems carry a 90 day warranty.

Deduct \$100 from prices for 18 bit MTI MXV21 controller.

DEC RL01/RL02 compatible system using 5 1/4" Winchester disk with MTI Q-bus controller:

5 mega-byte = 1 RL01 (IMI 5006) \$2750
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15 mega-byte = 3 RL01 (IMI 5018) \$2950
20 mega-byte = 4 RL01 or 2 RL02 (Rodime R0204) \$3100

IMI Systems carry a 1 yr. warranty, Rodime systems a 6 mo. warranty.

Call for details on other 5 1/4" floppy and Winchester disk systems, including complete systems incorporating Sigma enclosures.

Micro Technology, Inc. controllers used in the above systems for you do it yourselves, ribbon cables included:

MTI MXV21 Floppy disk controller (RX02 compatible, 18 bit addressing) \$700
MTI MXV22 Floppy disk controller (RX02 compatible, 22 bit addressing) \$800
MTI MLV11 Winchester controller (RL02 compatible 8" Winchester) \$1250
MTI MLV11M Winchester controller (RL01/02 compatible 5 1/4" Winchester) \$1250

Controllers carry a 1 yr. warranty from MTI

The 11 Connexion offers its desktop enclosures for 8" and 5 1/4" disk systems. These enclosures are made of .090 anodized aluminum painted with a tough commercial epoxy paint. The base is light gray with black trim and lettering and the top is egg shell white. Cabinets for 8" systems are 9"H x 11"W x 15"D and will hold a single full size 8" floppy or Winchester drive or two slim line floppy drives with room for many of the single board computers available today. The 5 1/4" cabinet is 6 1/2"H x 7"W x 11"D and will hold a single full size 5 1/4" floppy or Winchester or two half wide drives.

Cabinet w/feet, power switch, fasteners \$60
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IBM

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SS-DD	25.00	24.00
DS-DD	36.00	35.00

**(148) DEC SYSTEMS
FOR SALE**

PDP11/05 SYSTEM w/64K core. 2-5 1/4" expansion chassis; 2-RK05 disk drives w/ctrl; 2-RX01 floppy disk drives w/controller (RX11); 2-861C power control units; 2-48"x20"x28" cabinets w/fans,

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DEC RAINBOW 100 COMPUTER List \$3495, Sale \$2395. Call 513-421-3343 days; 513-661-1792 eves. 7-55

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**(149) DEC SYSTEMS
WANTED**

DECTAPE WANTED \$ or I.R.S. Plan. 602-626-6511. Robert Reinking, University of Arizona AHSC, Tucson, Arizona 85724. 4-54

**(150) DEC SOFTWARE,
PERIPHERAL**

DEC LA35 Decwriter II, perfect condition, \$250. Call Sherman,

305-434-7517. Ft. Lauderdale, Florida.

infoPROBE, a powerful data base program for scientific and commercial research. Easy to use: no programming required. Powerful multifield selection. Large file handling: up to 300 items/record. Quick results: selected lists, statistics, bar charts and scattergrams. Price \$445. Complete demonstration diskette and user's manual \$25. For RT-11, TSX, RSTS, IBM/pc and CP/M. infoPROBE is one of several research-oriented programs. Call or write for additional information. **Centre Computer Consultants**, P.O. Box 739, State College, PA 16804. 814-237-4535. 7-65

RAINBOW SOFTWARE dBASE 2 \$450. Deadline, suspended, enhancer \$49 each. C/80, spell, Zork I/II/III \$45 each. SASE others. **ZEIGHTY Data**, Box 28355CS, Columbus, Ohio 43228-0355. 7-55

TERAK 8510A-52A, LSI-11/264K Graphics Computer System. SS/SD 8 inch floppy, 8512-VDA. DS/DD 8 inch floppy, \$5000 or best offer. Dan, 518-266-6574.

**(154) IBM SYSTEMS
FOR SALE**

IBM SERIES/1 4953 CPU for sale. EC, but no peripherals. Best offer. Call Dr. B. Keane, 803-654-1450. 6-54

TWO - IBM 5100's, 5103 printer, 5106 auxiliary tape drive, basic and APL, 32K, A/R, G/L, over 50 tapes, one system has communications. Everything else the same. Contact Bob, 805-962-0461. 6-55

LOTUS 123 \$295, Sideways \$39.95, Flight Simulator \$35, Memory Shift \$59, Microsoft Word \$235, DBase II \$375, Supercalc 3 \$225. All products Mint. Plus much more. Call 804-868-8764 or write **Micro-Applications**, 35W Wainwright Drive, Poquoson, VA 23662 for current listing. Add 3% for charge cards and \$5 for shipping charges. Also available, software rental at 15% of wholesale costs - write for more information.

IBM SYSTEMS III. 5410 CPU, 1 5424 multi-function card unit; 2 5444 disk storage drives; 1 5203 600 line LPM printer; 3 5496 data recorders, 25-544 disk cartridges, full complement of manuals. Asking \$3500. Call 1-800-424-1213 ask for Lynn Markley, II, or write PO Box 1155, St. Joseph, MO 64502.

**(155) IBM SYSTEMS
WANTED**

IBM 5100 models B1-C4 with 5106, 5103. Working condition. 415-355-2075. 4-62

IBM DISPLAYWRITER word processor and high speed printer wanted. 412-523-3060 (answering machine answers after 12 rings).

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ALL DRIVES ARE NEW, FULL HEIGHT (4.6x8.5x14)

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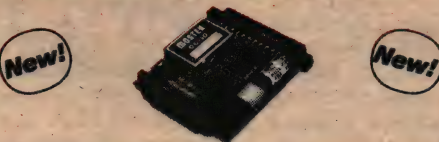
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HOME COMPUTER ACCESSORIES

RS232 ADAPTER FOR VIC-20 AND COMMODORE 64



The JE232CM allows connection of standard RS232 printers, modems, etc. to your VIC-20 and C-64. A 4-pole switch allows the inversion of the 4 control lines. Complete installation and operation instructions included.

• Plugs into User Port • Provides Standard RS232 signal levels • Uses 6 signals (Transmit, Receive, Clear to Send, Request to Send, Data Terminal Ready, Data Set Ready).

JE232CM \$39.95

VOICE SYNTHESIZER FOR APPLE AND COMMODORE



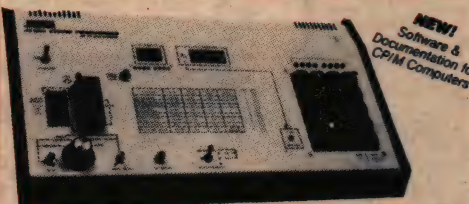
JE520CM

• Over 250 word vocabulary - affixes allow the formation of more than 500 words • Built-in amplifier, speaker, volume control, and audio jack • Recreates a clear, natural male voice • Plug-in user ready with documentation and sample software • Case size: 7 1/4" L x 3 1/4" W x 1-3/8" H

APPLICATIONS: • Security Warning • Telecommunication • Teaching • Handicap Aid • Instrumentation • Games

The JE520 VOICE SYNTHESIZER will plug right into your computer and allow you to enhance almost any application. Utilizing National Semiconductor's DIGITAL TALKER™ Speech Processor IC (with four custom memory chips), the JE520 compresses natural speech into digital memory, including the original inflections and emphases. The result is an extremely clear, natural vocalization.

Part No.	Description	Price
JE520CM	For Commodore 64 & VIC-20	\$114.95
JE520AP	For Apple II, II+, and IIe	\$149.95



JE664 EPROM PROGRAMMER

8K to 64K EPROMS — 24 & 28 Pin Packages
Completely Self-Contained — Requires No Additional Systems for Operation

• Programs and validates EPROMS • Checks for properly erased EPROMS • Emulates PROMs or EPROMs • RS232C Computer Interface for editing and program loading • Loads data into RAM by keyboard • Changes data in RAM by keyboard • Loads RAM from an EPROM • Compares EPROMs for content differences • Copies EPROMs • Power Input: 115VAC, 60Hz, less than 10W power consumption • Enclosure: Color-coordinated, light tan panels with molded end pieces in mocha brown • Size: 15 1/4" L x 8 1/4" D x 3 1/8" H • Weight: 5 1/2 lbs.

The JE664 EPROM Programmer emulates and programs various 8-Bit Word EPROMs from 8K to 64K. Bit memory capacity. Data can be entered into the JE664's internal 8K x 8-Bit RAM in three ways: (1) from a ROM or EPROM; (2) from an external computer via the optional JE665 RS232C BUS; (3) from its panel keyboard. The JE664's RAMs may be accessed for emulation purposes from the panel's test socket to an external microprocessor. In programming and emulation, the JE664 allows for examination, change and validation of program content. The JE664's RAMs can be programmed quickly to all "1"s (or any value), allowing unused addresses in the EPROM to be programmed later without necessity of "UV" erasing. The JE664 displays DATA and ADDRESS in convenient hexadecimal (alphanumeric) format. A "DISPLAY EPROM DATA" button changes the DATA readout from RAM word to EPROM word and is displayed in both hexadecimal and binary code. The front panel features a convenient operating guide. The JE664 Programmer includes one JM16A Jumper Module (as listed below).

JE664-A EPROM Programmer \$995.00
Assembled & Tested (Includes JM16A Module)

JE665 — RS232C INTERFACE OPTION — The RS232C Interface Option implements computer access to the JE664's RAM. This allows the computer to manipulate, store and transfer EPROM data to and from the JE664. A sample program listing is supplied in MBASIC for C/P/M computers. Documentation is provided to adapt the software to other computers with an RS232C port. 9600 Baud, 8-bit word, odd parity and 2 stop bits.

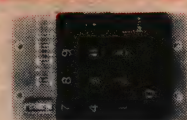
FOR A LIMITED TIME A SAMPLE OF SOFTWARE WRITTEN IN BASIC FOR THE TRS-80™ MODEL I, LEVEL II COMPUTER WILL ALSO BE PROVIDED.

JE664-ARS EPROM Prog. w/JE665 Option \$1195.00
Assembled & Tested (Includes JM16A Module)

EPROM JUMPER MODULES — The JE664's JUMPER MODULE (Personality Module) is a plug-in module that pre-sets the JE664 for the proper programming pulses to the EPROM and configures the EPROM socket connections for that particular EPROM.

JM16A EPROM Jumper Mod. No.	EPROM	Programming Voltage	EPROM MANUFACTURER	PRICE
JM16A	2708	25V	AMD, Motorola, Nat. Intel, TI, AMD, Hitachi, Mostek	\$14.95
JM16A	2716, TM2516 (T)	25V	Intel, Motorola, Nat. NEC, TI, AMD, Hitachi, Mostek	\$14.95
JM16B	TM2716 (3-V)	-5V, +5V, +12V	Motorola, TI	\$14.95
JM32A	TM2532	25V	Motorola, TI, Hitachi, ONI	\$14.95
JM32B	2732	25V	AMD, Fujitsu, NEC, Hitachi, Intel, Mitsubishi, National	\$14.95
JM32C	2732A	21V	Fujitsu, Intel	\$14.95
JM44A	MC46876A, MC46876A	21V	Motorola	\$14.95
JM44B	2764	21V	Intel, Fairchild, ONI	\$14.95
JM44C	TM2564	25V	TI	\$14.95

KEYBOARDS



HI-TEK 14-KEY NUMERIC KEYPAD

• Great keypad for many home and business computer applications • SPST switching • Mounted on PC board • Size 5" L x 3" W x 1 1/2" H • Color: Grey • Weight: 1 lb. • Spec available

K-14 \$9.95



MICRO SWITCH ASCII Encoded Keyboards

• Large selection of keyboards • Hall effect switching • Some have parallel interfaces • Some have serial interfaces • All have status LEDs and a minimum of 68 keys • Some with numeric keypad capabilities, cursor controls, or both • Styles may vary • Weight: 2 lbs. • No specs available

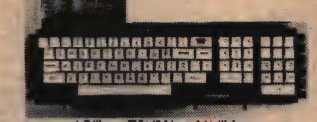
KB-MISC \$9.95



Mitsumi 54-Key Unencoded Matrix All-Purpose Keyboard

• SPST keyswitches • 20 pin ribbon cable connection • Low profile keys • Features: cursor controls, control, caps (lock), function, enter and shift keys • Color (keycaps): grey • Wt.: 1 lb. • Pinout included

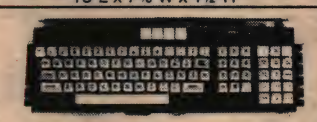
KB54 \$14.95



71-Key ASCII Cherry Keyboard

• 7 bit parallel ASCII with strobe • 11 key numeric keypad • SPST mechanical keyswitches • 15/30 card-edge connector • Features: escape, control, cursor controls, plus 10 add'l. special function keys • Color: white • Weight: 2 lbs. • Spec. included

KB1801 \$29.95



87-KEY ASCII Cherry Keyboard

• 12-key numeric keypad • Cursor keypad • SPST mechanical keyswitches • 40-pin header connector • Colors: main and numeric keypad—orange; Cursor keypad—yellow • Weight: 2 lbs. • Spec. included

KB8600 \$34.95



106-KEY 8-BIT SERIAL ASCII KEYBOARD

• The terminals were designed to be daisy chained around a central host computer and used as individual work stations • Hall effect switching • numeric and cursor keypad • 10 user definable keys • 50" interface cable with 9-pin sub-miniature connector • 7 LED function displays • Security lock • N-key rollover • Automatic key repeat function • Color: (case): white w/black panel—(key caps): grey and blue • Weight: 6 1/2 lbs. • Data included.

KB139 \$59.95

POWER SUPPLIES



TRANSACTION TECHNOLOGY, INC. 5VDC @ 1 AMP Regulated Power Supply

• Output: +5VDC @ 1.0 amp (also +30VDC regulated) • Input: 115VAC, 60 Hz • Two-tone (black/beige) self-enclosed case • 6 foot, 3-conductor black power cord • Size: 6 1/2" L x 7" W x 2 1/4" H • Weight: 3 lbs.

PS51194 \$14.95



Power/Mate Corp. REGULATED POWER SUPPLY

• Input: 105-125/210-250 VAC at 47-63 Hz • Line regulation: ±0.05% • Three mounting surfaces • Overvoltage protection • UL recognized • CSA certified

Part No.	Output	Size	Weight	Price
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EMAS/6C	5V@6A/6V@5A	5 1/4" L x 4 1/4" W x 2 1/4" H	4 lbs.	\$39.95



ASTEC SWITCHING REGULATED POWER SUPPLY

• Apple III Power Supply • Multiple outputs for bench top uses and other applications • Input: 115VAC, 50-60 Hz @ 3.0 amps • Output: +5VDC @ 1.0 amp, +12VDC @ 1.0 amp, -12VDC @ 1.0 amp, +24VDC @ 2.5 amp, -24VDC @ 2.5 amp • Size: 15 1/4" L x 3 1/4" W x 2 1/4" H • Weight: 2 1/2 lbs.

AS1155 \$39.95



POWER SUPPLY +5VDC @ 7.6 AMP, 12VDC @ 1.5 AMP SWITCHING

• Input: 115VAC, 50-60Hz @ 3 amp/230VAC, 50Hz @ 1.6 amp • Fan volt./power supply select switches (115/230VAC) • Output: 5VDC @ 7.6 amp, 12VDC @ 1.5 amp • 6 foot black power cord • Size: 11 1/4" L x 13 1/4" W x 3 1/4" H • Weight: 6 lbs.

PS94VOS \$39.95



KEPCO/TDK 4-OUTPUT SWITCHING POWER SUPPLY

• Ideal for disk drive needs of CRT terminals, microcomputers and video games • Input: 115/230VAC, 50/60Hz • Output: +5V @ 5 Amp, +12V @ 1.8 Amp, +12V @ 2 Amp, -12V @ 0.5 Amp • UL recognized • CSA certified • Size: 7 1/4" L x 6-3/16" W x 1 1/4" H • Weight: 2 lbs.

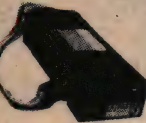
MRM 174KF \$59.95



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• Microprocessor, mini-computer, terminal, medical equipment and process control applications • Input: 90-130VAC, 47-440Hz • Output: +5VDC @ 5A, -5VDC @ 1A, +12VDC @ 1A, -12VDC @ 1A • Line regulations: ±0.2% • Ripple: 30mV p-p • Load regulation: ±1% • Overcurrent protection • Adj: 5V main output ±10% • Size: 6 1/4" L x 1 1/4" W x 4-15/16" H • Weight: 1 1/2 lbs.

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Switching Power Supply for APPLE II; II+ & IIe™

• Can drive four floppy disk drives and up to eight expansion cards • Short circuit and overload protection • Fits inside Apple computer • Fully regulated +5V @ 5A, +12V @ 1.5A, -5V @ .5A, -12V @ .5A • Direct plug-in power cord included • Size: 9 1/4" L x 3 1/2" W x 2 1/4" H • Weight: 2 lbs.

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JE750 Alarm Clock Kit \$29.95

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5 1/4" APPLE™ Direct Plug-In Compatible Disk Drive

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Microcomputer Power Inc. Regulated Power Supply

+5VDC @ 6 Amps
+12VDC @ 4 Amps
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• Perfect for computer or disk drive systems • Supply has AMP connectors for direct connection to two 5 1/4" disk drives • Cooling fan • Input: 100/115/200/230VAC, 47-63Hz • Output (above) • Weight: 9 lbs.

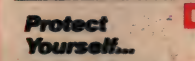
CP167 \$59.95



DATASHIELD® Surge Protector

• Eliminates voltage spikes and EMI-RFI noise before it can damage your equipment or cause data loss • 6 month warranty • Power dissipation (100 microseconds): 1,000,000 watts • 6 sockets • 6 foot power cord • Normal line voltage indicator light • Brown out/black out reset switch • Weight: 2 lbs.

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IBM64K (Nine 200ns 64K RAMs) \$49.95

TRS-80 MEMORY EXPANSION KIT

TRS-80 to 16K, 32K, or 48K

**Model 1 = From 4K to 16K Requires (1) One Kit
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Easy to install kits comes complete with 8 ea. 4164-2 (200ns) 64K dynamic RAMs and conversion documentation. Converts TRS-80 color computers with D, E, ET, F and NC circuit boards to 32K. Also converts TRS-80 color computer II to 64K. Flex DOS or OS-9 required to utilize full 64K RAM on all computers.

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UV-EPROM Eraser



8 Chips — 51 Minutes

1 Chip — 37 Minutes

Erases 2708, 2716, 2732, 2764, 2516, 2532, 2564. Erases up to 8 chips within 51 minutes (1 chip in 37 minutes). Maintains constant exposure distance of one inch. Special conductive foam liner eliminates static build-up. Built-in safety lock to prevent UV exposure. Compact — only 9.00" x 3.70" x 2.00". Complete with holding tray for 8 chips.

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UVS-11EL Replacement Bulb \$16.95

(156) IBM SOFTWARE PERIPHERAL

TRS80 Mini/4 RS232C bare board with documentation, \$6. 404-939-4137 after 7pm. Pat Keller, 6113 Rolling Way, Norcross, GA 30093.

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(160) NCR SYSTEMS**(162) NCR, SOFTWARE, PERIPHERAL**

Computer Shopper's deadline is the 2nd Monday of the month.

(166) MISC. (HARDWARE & SOFTWARE)

QUAY 900 64K CPM with 912C terminal 2.4MB DSDD 8" system sells for over \$5000. Must go - Excellent condition - \$1500. 304-242-9204 evenings. 5-54

AUTO-CAD, Drafting & Design System for Victor 9000. Touchpen, screen (4000 x 4000 resolution), controller card. 127 layers per drawing. Automatic dimensioning. \$1795. 316-382-2238. 6-54

WANG LABORATORIES Computer and peripherals for sale. CPU, CRT, disk drives, printers, memory and softwares. Call or write **Data Management, Inc.**, P.O. Box 406, Croton Falls, NY 10519. 212-294-8087. 4-61

ADDS SYSTEM 70 - complete hardware and software library - includes every user and support manual including tutorial and high level language manuals - all for \$40. C. Pastore, PO Box 701, Nesconset, New York 11767. 516-435-0222 (days). 7-55

MULTI-USER Computer System WICAT 200 with 160 Megabyte hard disk includes CPU, 6 terminals, all necessary hardware for set-up and spread sheet and word processing software packages. Language capability includes APL, Fortran and SMC Basic. Original purchase date August 1983. For information contact: **Mr. Joel L. Cooper**, Fred. S. James & Co. of New York, Inc., 830 Morris Turnpike, Short Hills, New Jersey 07078.

(170) CARD READERS

Computer Shopper's deadline for display and classified ads is the 2nd Monday of the month.

(172) DISK DRIVES

SHUGART SA851/850 8" Disk Drive 2-sided/2-density. 115VAC/60Hz Mint in factory carton, \$325. Call Joe, 415-872-3021/994-4291. 6-54

8" SSDD TANDON 848-1 half-height disk drives. Used less than 5 hours. Like new. Two drives, \$300 each. **Donald R. Bell**, 711 East Davis Street, Burlington, NC 27215. 804-782-4710 days, Mon-Fri. 6-54

SHUGART MOD. 860 DSDD 8" - 1/2 height drives unused and with 30 day warranty. This drive operates on DC only. No AC required. \$279 each. C.E.C., 415-342-4058. P.O. Box 1965, Burlingame, CA 94010. 7-56

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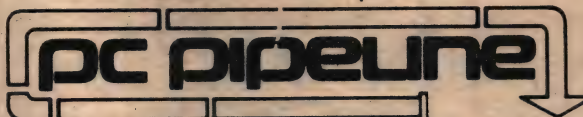
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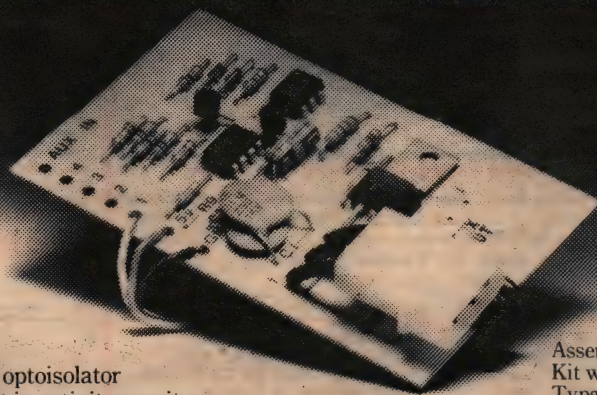
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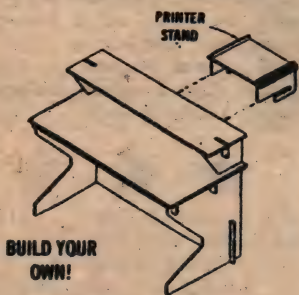
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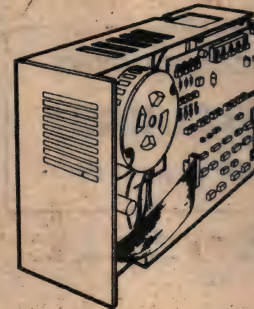
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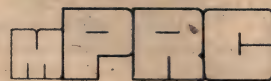
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(174) PRINTERS

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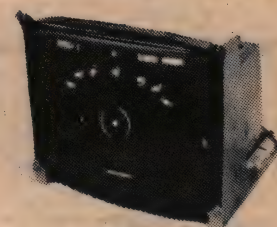
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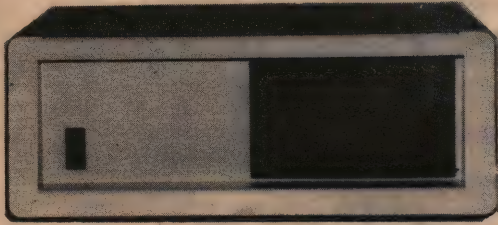
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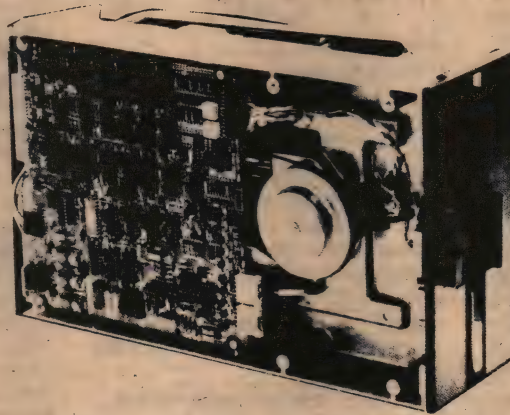
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Index to Software Categories and Abbreviations

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 • CODE.....
 CAI Computer Aided Instr.
 GRA Graphics
 HOM Home Economics
 PER Personal + Recreation

PROGRAMMING
 • CODE.....
 ASM Assembler
 BAS BASIC Language
 COB Cobol Language
 CST Cassette Program
 DBM Data Base Manager
 EDT Editor
 FOR FORTRAN Language
 FTH Forth Language
 LNG Other Languages
 O/S Operating System
 PAS Pascal Language
 RPT Report Writer

SOU Sound Prog./Device
TEL Telecommunications
UTL UTILITY/OTHER
CAT EXTENSIVE CATALOG
OTH OTHER PROGRAMS AND SOFTWARE

CUS CUSTOMIZED S/WARE

BUSINESS

• CODE.....
 ANA Business Analysis
 A/P Accounts Payable
 A/R Accounts Receivable
 BUS General Bus./Other
 CAS Cash Register
 G/L General Ledger
 INV Inventory
 JOB Job Costing
 MAI Mailing List
 OMG Osborne/McGraw-Hill Business Pkg.

PKG Complete Package
PAY Payroll
TAX Tax Packages
W/P Word Processing

INDUSTRIAL
 • CODE.....
 BWL Bowling League Sec.
 CPA Cert. Public Accounting
 DEN Dental
 ENG Engineering
 FIN Financial
 INS Insurance
 LAW Legal
 MED Medical
 PTR Prof. Time Reporter
 REA Real Estate
 SAL Sales Analysis
 STA Statistics
 SXC Stock Exchange

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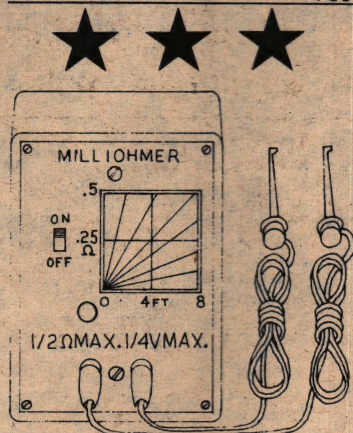
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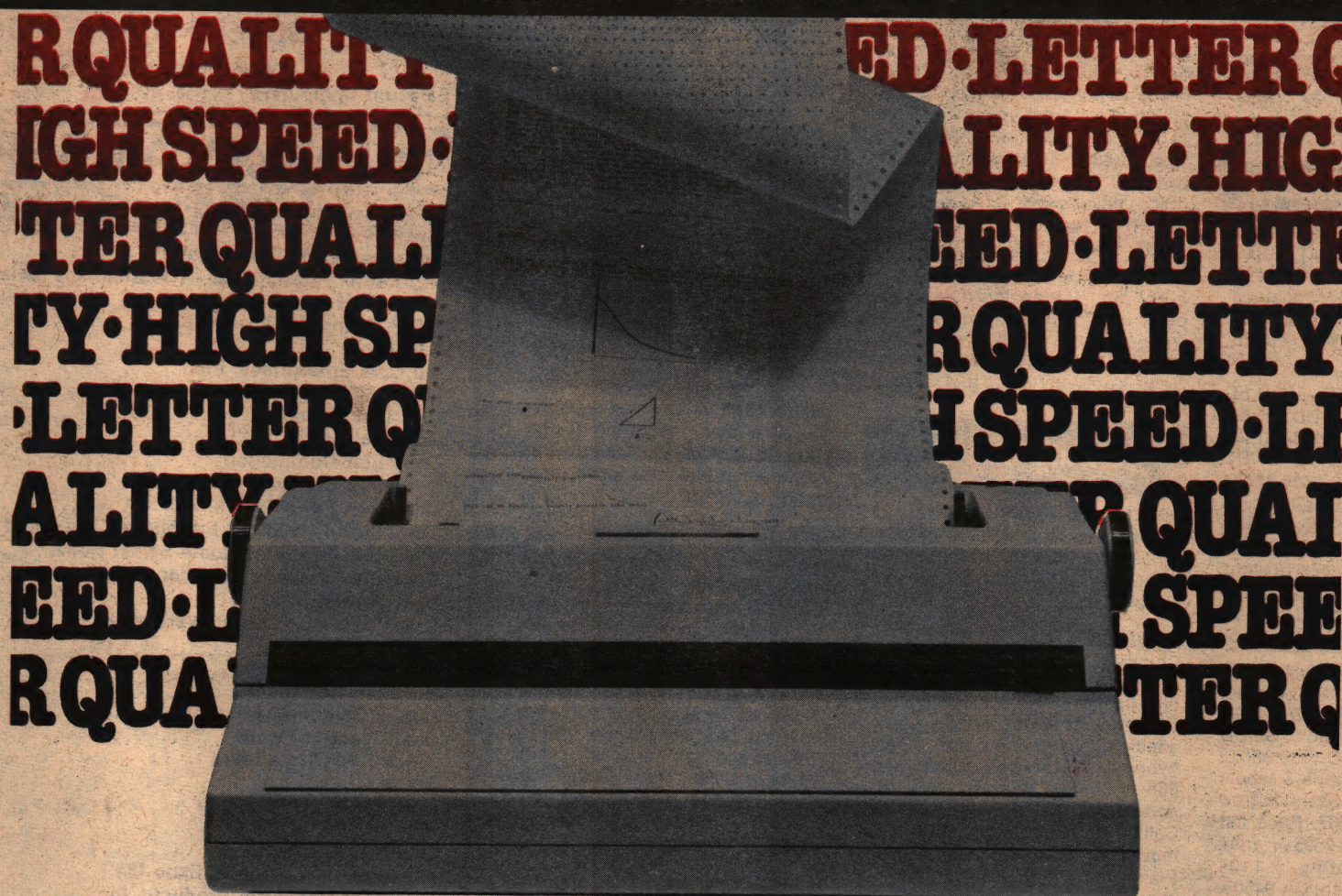
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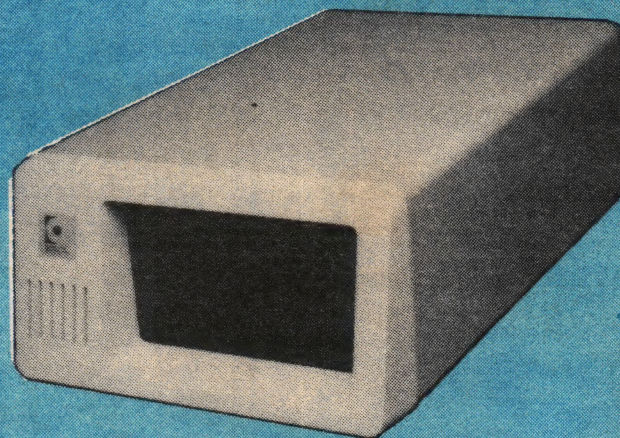
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